



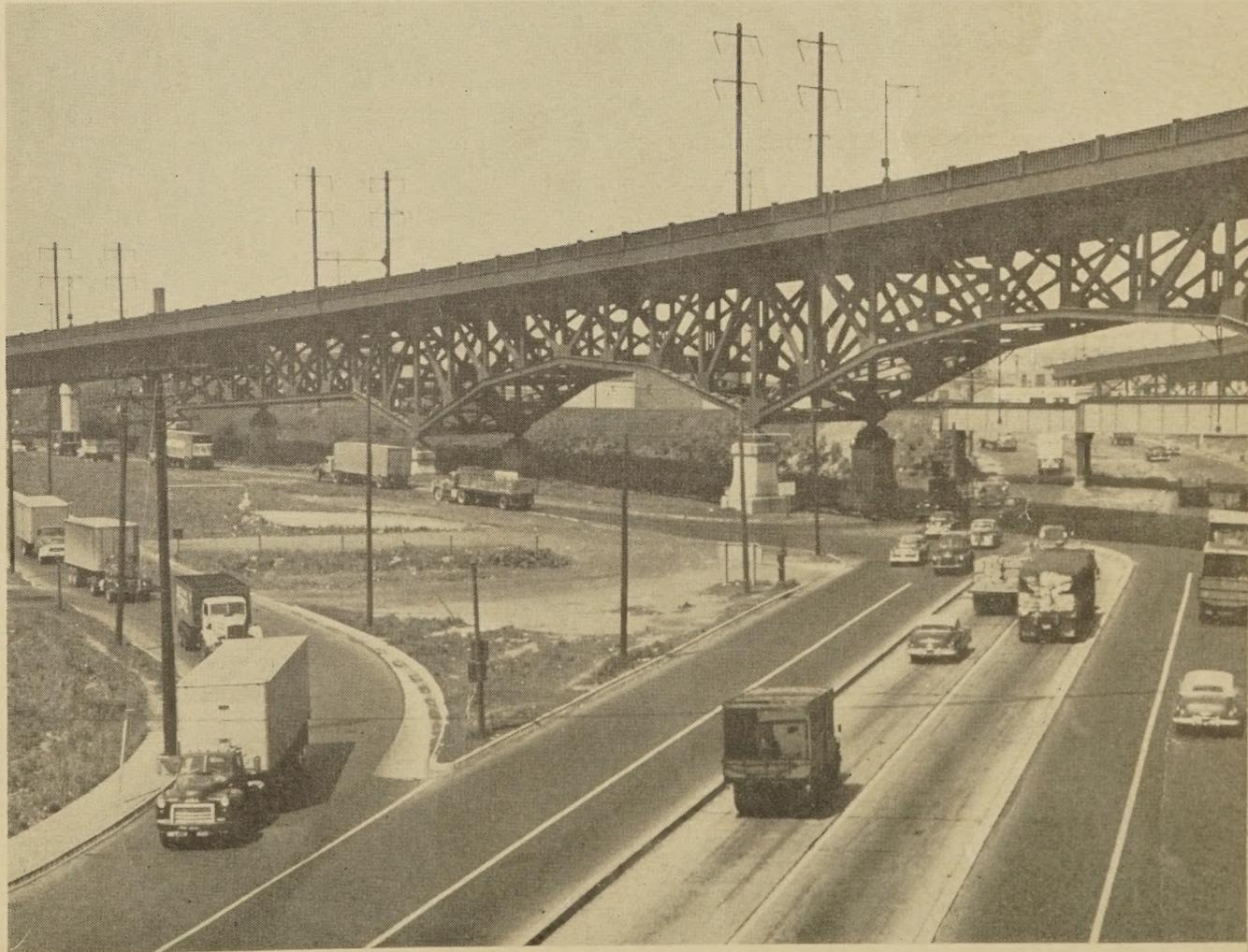


# Public Roads

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In this issue: A study of road-user and property taxes on selected vehicles. (Major truck routes U. S. 1 and 9 in the Newark, N. J., area. Pulaski Skyway in the foreground.)

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U. S. DEPARTMENT OF COMMERCE  
SINCLAIR WEEKS, Secretary

BUREAU OF PUBLIC ROADS  
CHARLES D. CURTISS, Commissioner

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# Road-User and Property Taxes on Selected Motor Vehicles, 1956

BY THE RESEARCH REPORTS BRANCH  
BUREAU OF PUBLIC ROADS

Reported by EDWIN M. COPE, Chief  
Highway Statistics Section,  
and LAURENCE L. LISTON,  
Transportation Economist

THE continued growth of the total economy could be retarded by lack of adequate highways. The key to adequate highways is, of course, money and since by far the largest part of revenues for highways is derived from road-user taxes, the road-user taxes of almost all jurisdictions are under study. The purpose of this article is to supply basic data on road-user taxes under existing legislation as of January 1, 1956, and to show to the extent practical the relation of road-user taxes to general property taxes; and in so doing, to give public authorities both direct measurement of the impact of the taxes on different vehicles, and to help in placing these taxes in perspective. This study is entirely objective and is not intended to indicate support for or opposition to any tax policy.

Twice before, the Bureau of Public Roads has presented studies that had the limited objective of making it possible to compare the road-user taxes of each State with those of other States on similar vehicles and similar services.<sup>1</sup> The previous studies were extensively used by public authorities, legislatures, and highway-user groups as basic material in their efforts to find revenues to close the gap between the rapidly increasing need for highways and existing highway facilities.

In the past 3 years, the number of vehicles has increased from 53 million to 63 million; and the States and Federal governments are resurveying highway needs and exploring sources of revenue to meet those needs. A great deal of study has been given to highway finance theories—ability to pay, the cost and value of the service, the incremental theory—

<sup>1</sup> *Road-user and property taxes on selected motor vehicles, 1953*, by Edwin M. Cope and Richard W. Meadows. PUBLIC ROADS, vol. 27, No. 7, April 1953; also *State road-user and personal-property taxes on selected motor vehicles, 1950*, by R. W. Meadows and S. F. Bielak. PUBLIC ROADS, vol. 26, No. 2, June 1950.

*The inseparable link between highway improvement and economic growth has focused public attention upon the financing of highways needed to accompany this growth. The great bulk of revenue for highway improvement is derived from road-user taxes. The purpose of this article is to provide data that make it possible to compare the total direct State and personal-property taxes on the road-user, as well as the yields from the individual levies. The data permit direct measurement of existing taxes so that comparisons can be made between vehicles, between States, and between different services.*

*This is done by showing the amounts of State road-user taxes and all direct personal-property taxes that would be paid in each State during one full year at rates in effect January 1, 1956, for each of 11 typical vehicles that represent significant points in the tax range.*

*For vehicles operating under uniform assumed conditions, the imposts vary in total amounts paid annually from \$30 for a pickup farm truck to \$4,379 for a five-axle diesel combination. The national average for a lightweight passenger car is \$62. The familiar three-axle combination, in private use, pays on the average \$334 in registration fees, \$461 in motor-fuel tax, and \$157 in property tax.*

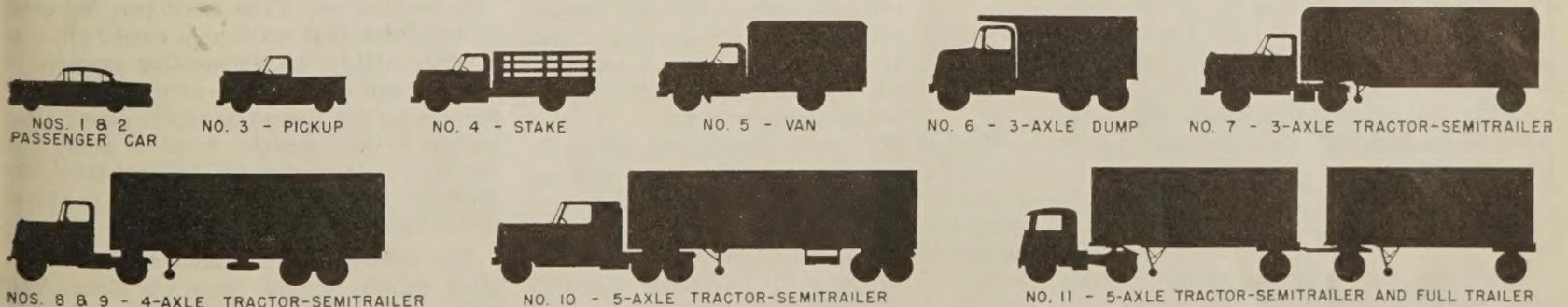
and to the portion of the cost of highways that should be attributed to defense. But for effective work in tax theory and application, there is need for measurement of the amounts already being collected under existing tax rates. In the search for revenue, full consideration must be given to the present burden of all direct taxes, including property taxes on the vehicle owner.

The principal current State road-user revenues are derived from the gasoline tax and from registration fees on motor vehicles, but in some States a relatively low gasoline tax is accompanied by above-average registration fees, whereas in others, higher gasoline taxes are accompanied by low registration fees. In Georgia an automobile can be registered for \$3 and the gasoline-tax rate is 6½ cents; in New York State it costs five times as much to register the same automobile, but the gasoline tax is only 4 cents. The result is that road-user taxes are about the same on an automobile in the two States, assuming average travel.

As in previous efforts, it is the purpose of this study to provide data that make it possible to compare the total direct State and personal-property taxes on the road-user, as well as the yields from the individual levies. Data presented here make possible direct measurement of existing taxes so that comparisons can be made between vehicles, between States, and between different services. This is done by showing the amounts of State road-user taxes and all direct personal-property taxes that would be paid in each State during one full year at rates in effect January 1, 1956, for each of a group of vehicles that represent significant points in the tax range.

This study is similar in many respects to the one published in 1953.<sup>2</sup> Extensive borrowing from the previous study has facilitated the preparation of this article. The similarity in the method of presentation should be an advantage to those who have used the previous material and will use the material presented here.

<sup>2</sup> See footnote 1.



It is emphasized that the principal purpose of this article is to present the tax rates on a selected group of vehicles, and to make possible the comparison of the rates of one State with those of another.

The methods used and assumptions made in deriving the values presented should be carefully studied in order to avoid misuse through misunderstanding. That any vehicle would pay the precise annual amounts shown in the tabulations and figures is improbable, and this is particularly true for the large commercial vehicles. Consideration was given to reporting tax rates on the basis of ton-miles or vehicle-miles. The decision to show annual tax rates for selected vehicles has the following advantages: Such rates are more readily understood by the interested layman; many of the taxes and fees are levied on an annual basis; and using the same assumptions, the relative positions of the States are the same on either an annual or a vehicle-mile basis.

Previous studies evoked considerable discussion, and the authors received criticisms and suggestions. Some readers considered the annual mileages assumed for various vehicles to be too low, and others considered the mileages to be too high. That these criticisms had some effect is evidenced by the fact that the annual mileages assumed for the largest vehicles in this study are lower than those in the 1953 study.

Although there should be no difference between the relative positions of the States when comparing their vehicle taxes on an annual basis or comparing them on a vehicle-mile basis, the annual mileage assumed for the purpose of making the comparison can be important. If the annual mileage assumed is too low, those States with relatively large license or other annual fees, but no mileage taxes, are placed in an unfavorable light in comparison with States that have lower annual fees but do impose mileage taxes. On the other hand, if the assumed mileages are too great the States with mileage taxes are placed in an unfavorable light when compared with those that depend principally upon high annual fees for the taxation of heavy vehicles. It should not be assumed that the rates of taxation presented in this study are the actual amounts paid on any vehicle to a single State.

Nevertheless, the relative comparisons remain valid. The annual amount shown for each vehicle and each State is the amount that would be paid if all States had the same rate of tax as the State for which the data are presented, and if there were either complete reciprocity or proration of the registration fees, permanent fees, and similar imposts. Presentation of the tax data on a vehicle-mile basis would undoubtedly have lessened the possibility of the payments being misinterpreted, but it was felt that such procedure would greatly decrease the usefulness to legislative bodies, highway administrators, and the general public.

### *The Typical Vehicles*

The bases for registering motor vehicles vary considerably among the States. As

shown in table 1, the most common basis for registering passenger cars is the flat fee with no regard for other factors. Mississippi, in contrast, determines the levy by compounding a fixed fee and factors based on horsepower, gross weight, and vehicle age. The different bases for passenger-car registration are shown in figure 1, and those for trucks are given in figure 2. State gasoline-tax rates are represented in figure 3, and the States in which motor vehicles are taxed as personal property are shown in figure 4.

Eleven vehicles that are reasonably representative of the types and sizes that comprise the vehicle population were selected for the study: two passenger cars, four single-unit trucks, and five combinations. Their relative sizes and axle arrangements are shown in silhouette on page 37. Brief descriptions of the vehicles follow:

#### PASSENGER CARS:

- No. 1.—A lightweight club coupe.
- No. 2.—A mediumweight sedan.

#### SINGLE-UNIT TRUCKS:

- No. 3.—A pickup truck registered for 4,800 pounds gross weight (commonly called a "½-ton" truck).
- No. 4.—A stake truck registered for 12,500 pounds gross weight (commonly called a "1½-ton" truck).
- No. 5.—A van registered for 19,000 pounds gross weight (commonly called a "2¼-ton" truck).
- No. 6.—A tandem-axle dump truck registered for 40,000 pounds gross weight, of the type used in hauling coal, building materials, etc.

#### COMBINATIONS:

- No. 7.—A three-axle tractor-semitrailer registered for 40,000 pounds gross weight, chosen so that it falls within the maximum length and weight limits of all States.
- No. 8.—A four-axle tractor-semitrailer (tandem axles on the semitrailer), gasoline-powered, and registered for 50,000 pounds gross weight (No. 9 is the same vehicle, but with diesel power).
- No. 9.—A four-axle tractor-semitrailer (tandem axles on the semitrailer), diesel-powered, and registered for 50,000 pounds gross weight (No. 8 is the same vehicle, but with gasoline power).
- No. 10.—A five-axle tractor-semitrailer (tandem axles on both units), diesel-powered, and registered for 62,000 pounds gross weight.
- No. 11.—A combination composed of a two-axle, cab-over-engine, diesel-powered tractor-truck, a single axle semitrailer and a two-axle full trailer; registered for 72,000 pounds gross weight.

The 40,000-pound combination (No. 7) would be permitted to register and operate in any State, and the 40,000-pound tandem axle, single-unit truck (No. 6) would be permitted to operate in any State except Washington, which has a flat limitation of 36,000 pounds on a truck with three axles. The

Mississippi law that previously set a maximum of 37,650 pounds for such vehicles was revised in 1954 to permit 41,000 pounds. Because of axle spacing and axle-load limits, the 40,000-pound single-unit truck is on the border line of legality in some States with respect to registration and operation, but it has been included in order to show that point in the tax schedules. Although the 40,000-pound single-unit truck is found chiefly in specialized operations, the 40,000-pound, three-axle combination is in almost universal use and is undoubtedly the most common heavy unit.

When the 1953 study was made, three States (Kentucky, Pennsylvania, and Tennessee) prohibited vehicles as heavy as the 50,000-pound combination (vehicle Nos. 8 and 9), but since that time the Tennessee limit has been increased from 42,000 to 55,900 pounds, and the Pennsylvania limit has been increased from 45,000 to 60,000 pounds. Thus, Kentucky alone as late as January 1956 prohibited a 50,000-pound combination.

In order to compare taxes on vehicles similar in most respects except for type of fuel used, two 50,000-pound, four-axle combinations were included in the study, one with a gasoline engine and the other with a diesel engine. The assumption made that the gasoline combination operates 4 miles per gallon and that the fuel-consumption rate of the diesel combination is 6 miles per gallon is arbitrary, but is believed to be reasonable. It is recognized that the difference in the miles-per-gallon rates of two individual vehicles may fall substantially short of or exceed the assumed differential (a 50-percent difference in consumption may also be expressed as a one-third saving in fuel). Seven States now impose a higher tax on diesel fuel than on gasoline, and numerous other States are studying such a step with a view to reducing or eliminating the apparent tax advantage of the diesel-powered vehicle.

The 62,000-pound combination (No. 10) is a five-axle, diesel-powered, tractor-semitrailer combination 49 feet long, that can be operated in the West and a few Eastern States that are not contiguous, as shown in figure 5. Diesel power was specified for all of the heavier combinations, since it has had a tendency to replace gasoline power in the larger units where the heavier diesel engine may be efficiently employed. The 72,000-pound tractor semitrailer and full-trailer combination (No. 11) is permitted in Ohio and nine of the Western States.

In 19 States the registration schedule imposes a higher fee on a three-axle single-unit 40,000-pound truck than it does on a three-axle combination. (This is not true, however in any State that registers a combination as a single unit.) An outstanding example of this is found in Montana, where the registration fee for the three-axle 40,000-pound gross vehicle weight straight truck is \$400, but the total registration fee for the three-axle 40,000-pound gross vehicle weight combination is \$100.

The inclusion or exclusion of data for a given vehicle in each State was determined solely on the basis of whether the vehicle, as

Table 1.—Basis for registration of passenger cars

EMPTY WEIGHT OR SHIPPING WEIGHT	
<b>FLAT FEE:</b> Alabama Arizona California Connecticut Kentucky Louisiana Nevada Ohio Oregon Pennsylvania Utah Virginia Washington Wisconsin Wyoming Idaho Vermont	<b>WEIGHT GROUPS:</b> Delaware Florida Maryland Montana Nebraska New Jersey North Carolina Tennessee Texas District of Columbia
<b>FLAT FEE AND AGE:</b> Horsepower groups: Illinois Maine Massachusetts Missouri	<b>WEIGHT GROUPS AND HORSEPOWER:</b> New Hampshire Rhode Island
<b>FLAT FEE AND AGE:</b> 100-POUND INTERVALS: Colorado Michigan New York West Virginia AGE: New Mexico 100-POUND INTERVALS, VALUE AND AGE: Iowa Georgia South Carolina	<b>WEIGHT GROUPS AND HORSEPOWER:</b> Arkansas
<b>FLAT FEE, HORSEPOWER, GROSS WEIGHT,                      AND AGE:</b> Mississippi	<b>WEIGHT GROUPS AND HORSEPOWER:</b> Kansas

Table 2.—Data used in computing State road-user taxes and property taxes on selected vehicles, 1956 registration year

Factors affecting taxation	Tractor-semitrailer combinations																			
	Passenger cars		Single-unit trucks			No. 7		No. 8 (gasoline)		No. 9 (diesel)		No. 10 (diesel)		Tractor-semitrailer and full trailer						
	No. 1: Light	No. 2: Medium	No. 3: Pickup	No. 4: Stake	No. 5: Van	No. 6: Dump	Tractor-truck	Semi-trailer	Tractor-truck	Semi-trailer	Tractor-truck	Semi-trailer	Tractor-truck	Semi-trailer	No. 11 (diesel)					
Body type	Club coupe, 6-pass.	4-door, 6-pass.	Pickup	Stake	Van	Dump	Tractor	Semi-trailer	Tractor	Semi-trailer	Tractor	Semi-trailer	Tractor	Semi-trailer	Tractor	Semi-trailer	Tractor	Semi-trailer	Tractor	Semi-trailer
Price, f. o. b. factory (1954)	\$1,790	\$2,555	\$1,562	\$2,217	\$5,263	\$10,671	\$5,631	\$5,200	\$7,150	\$5,785	\$10,868	\$8,087	\$16,346	\$8,788	\$18,312	\$4,800	\$6,800	\$4,800	\$6,800	\$6,800
Horsepower, N. A. C. C. (S. A. E.)	25-35	51-20	31-5	30-40	46-51	38-40	46-20	46-20	38-40	40-84	40-84	200	45-90	200	40-84	200	40-84	200	40-84	200
Horsepower, maximum brake	110	195	115	108	153	145	155	145	145	200	200	200	165	200	200	200	200	200	200	200
Weight	2,982	3,805	3,266	3,750	5,477	12,200	7,915	7,300	9,620	7,470	10,050	9,500	17,015	9,500	11,300	6,585	9,560	6,585	9,560	9,560
Manufacturer's rated capacity, tons	2,982	3,805	3,266	3,750	5,477	12,200	7,915	7,300	9,620	7,470	10,050	9,500	17,015	9,500	11,300	6,585	9,560	6,585	9,560	9,560
Empty weight	2,982	3,805	3,266	3,750	5,477	12,200	7,915	7,300	9,620	7,470	10,050	9,500	17,015	9,500	11,300	6,585	9,560	6,585	9,560	9,560
Lead capacity	3,882	4,705	4,800	7,012	11,325	23,000	14,985	13,380	19,530	18,000	23,000	27,000	36,000	26,000	25,000	15,000	32,000	15,000	32,000	32,000
Gross vehicle weight	3,882	4,705	4,800	7,012	11,325	23,000	14,985	13,380	19,530	18,000	23,000	27,000	36,000	26,000	25,000	15,000	32,000	15,000	32,000	32,000
Gross weight of combination	3,882	4,705	4,800	7,012	11,325	23,000	14,985	13,380	19,530	18,000	23,000	27,000	36,000	26,000	25,000	15,000	32,000	15,000	32,000	32,000
Length	110	145	110	154	174	178-48½	147	142	142	48½	43	43	48½	48½	60	60	60	60	60	60
Wheelbase	110	145	110	154	174	178-48½	147	142	142	48½	43	43	48½	48½	60	60	60	60	60	60
Distance between tandem axles	110	145	110	154	174	178-48½	147	142	142	48½	43	43	48½	48½	60	60	60	60	60	60
Length of combination	110	145	110	154	174	178-48½	147	142	142	48½	43	43	48½	48½	60	60	60	60	60	60
Tires	6.50 x 16	6.50 x 16	6.50 x 16	7.50 x 20	9.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20
Size	6.50 x 16	6.50 x 16	6.50 x 16	7.50 x 20	9.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20	10.00 x 20
Ply rating	6	6	6	8	10	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Front arrangement	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
Rear arrangement	Single	Single	Single	Dual	Dual	Dual-tandem	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual
Total annual travel:	9,500	10,500	9,000	12,000	15,000	30,000	40,000	40,000	60,000	60,000	60,000	60,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Farm service	16.5	14.5	15.5	10.0	6.5	4.0	5.0	5.0	4.0	6.0	6.0	6.0	4.7	4.7	4.3	4.3	4.3	4.3	4.3	4.3
Private operation	576	724	387	550	2,307	7,500	8,000	8,000	15,000	15,000	15,000	15,000	14,894	14,894	16,279	16,279	16,279	16,279	16,279	16,279
Contract carrier	576	724	387	550	2,307	7,500	8,000	8,000	15,000	15,000	15,000	15,000	14,894	14,894	16,279	16,279	16,279	16,279	16,279	16,279
Annual motor-fuel consumption:	576	724	387	550	2,307	7,500	8,000	8,000	15,000	15,000	15,000	15,000	14,894	14,894	16,279	16,279	16,279	16,279	16,279	16,279
Farm service	576	724	387	550	2,307	7,500	8,000	8,000	15,000	15,000	15,000	15,000	14,894	14,894	16,279	16,279	16,279	16,279	16,279	16,279
Private operation	576	724	387	550	2,307	7,500	8,000	8,000	15,000	15,000	15,000	15,000	14,894	14,894	16,279	16,279	16,279	16,279	16,279	16,279
Contract carrier	576	724	387	550	2,307	7,500	8,000	8,000	15,000	15,000	15,000	15,000	14,894	14,894	16,279	16,279	16,279	16,279	16,279	16,279
Total revenue ton-miles (average load)	9,500	10,500	9,000	12,000	15,000	30,000	40,000	40,000	60,000	60,000	60,000	60,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Average gross weight	9,500	10,500	9,000	12,000	15,000	30,000	40,000	40,000	60,000	60,000	60,000	60,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Gross annual earnings	9,500	10,500	9,000	12,000	15,000	30,000	40,000	40,000	60,000	60,000	60,000	60,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000

1 Distances between axles on vehicle No. 11 are as follows: first and second, 114 inches; second and third, 221 inches; third and fourth, 98¾ inches; and fourth and fifth, 233 inches.

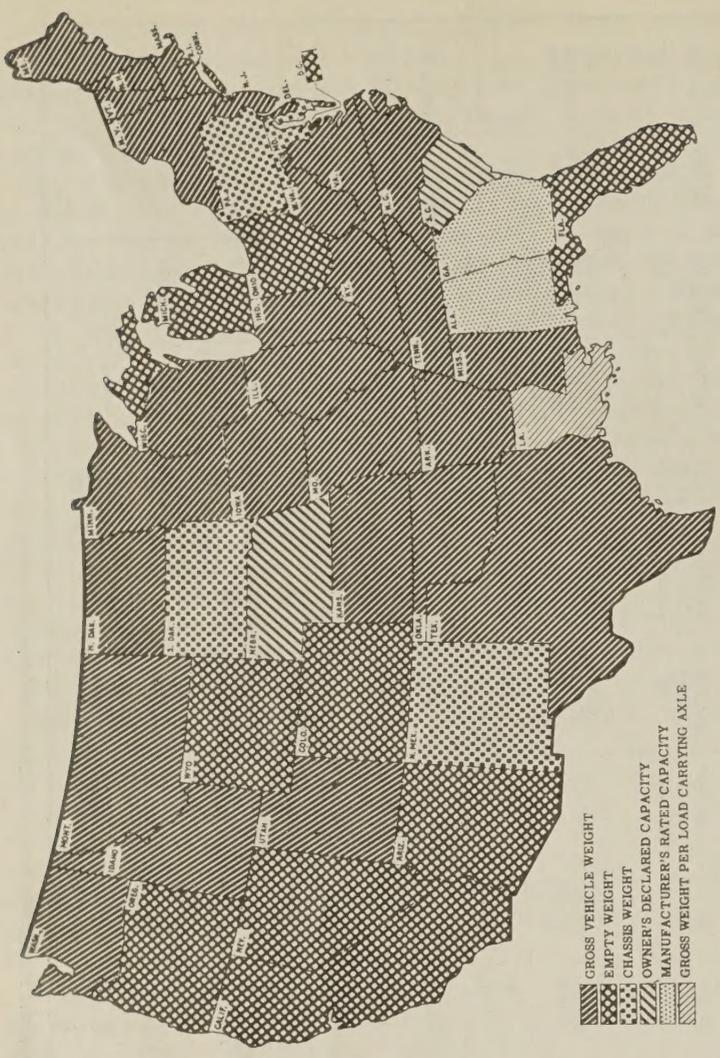


Figure 2.—Truck registration fee basis.

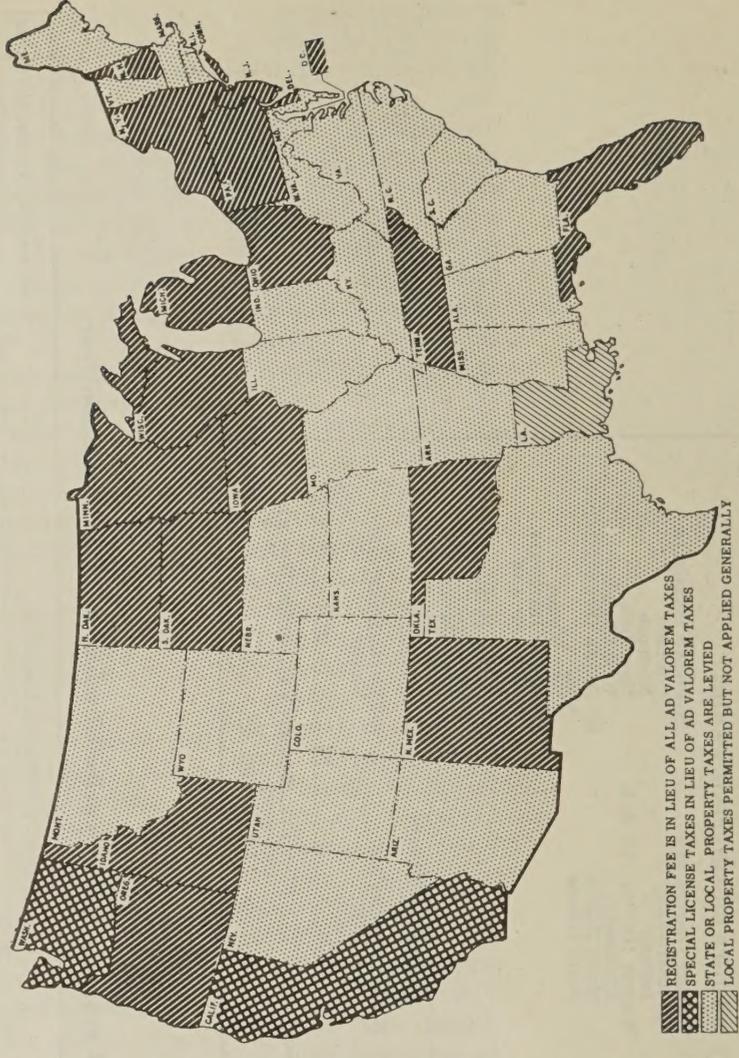


Figure 4.—Application of personal-property taxes to motor vehicles.

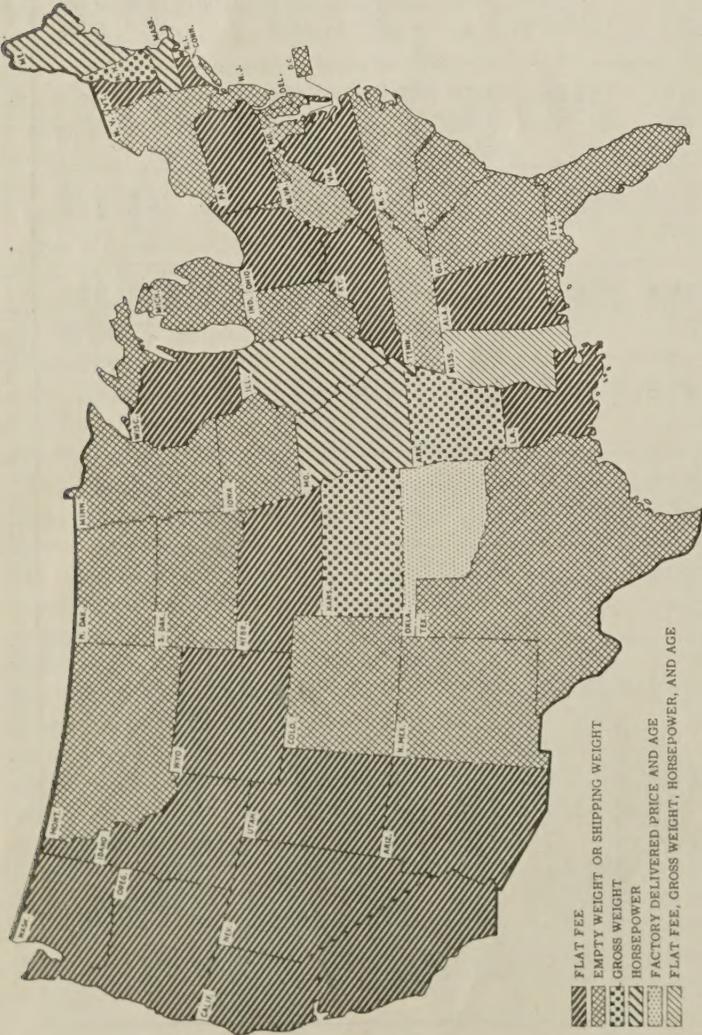


Figure 1.—Passenger-car registration fee basis.

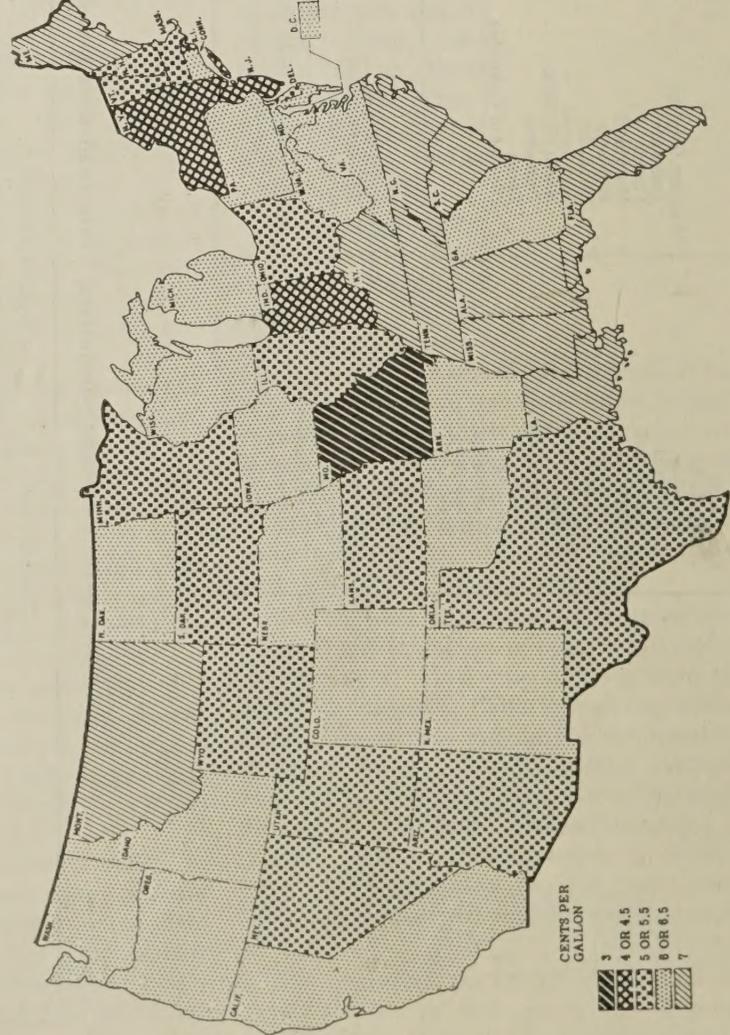


Figure 3.—State gasoline tax rates.

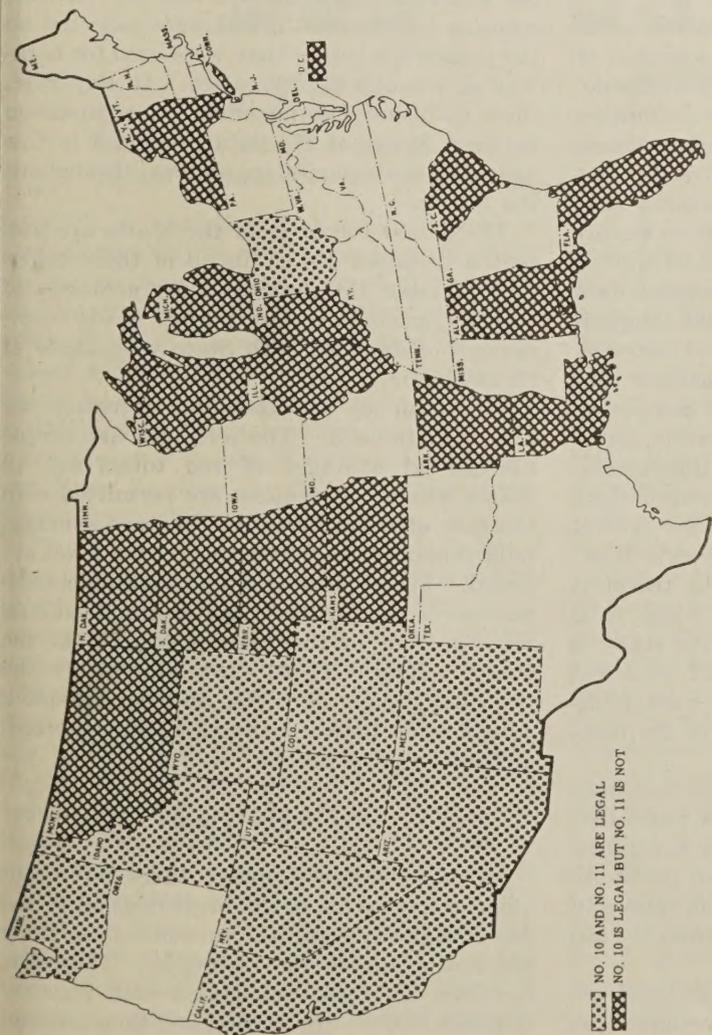


Figure 5.—Legality of 62,000-pound tractor-semitrailer (No. 10) and 72,000-pound tractor-semitrailer and full trailer (No. 11).

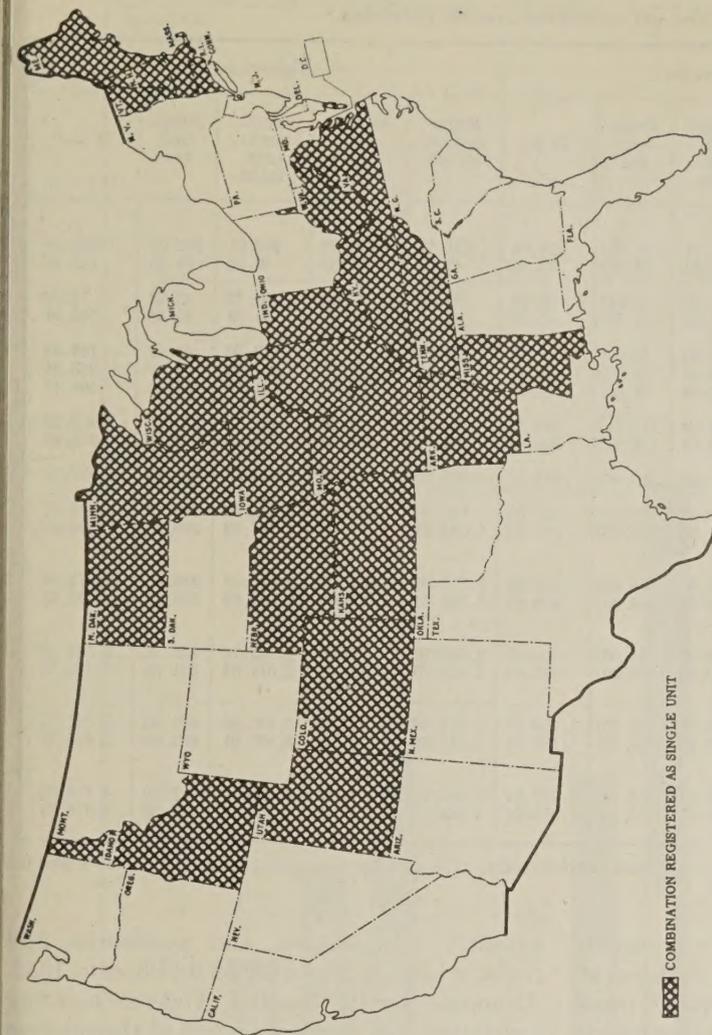


Figure 6.—Registration of tractor-semitrailer as a single unit.

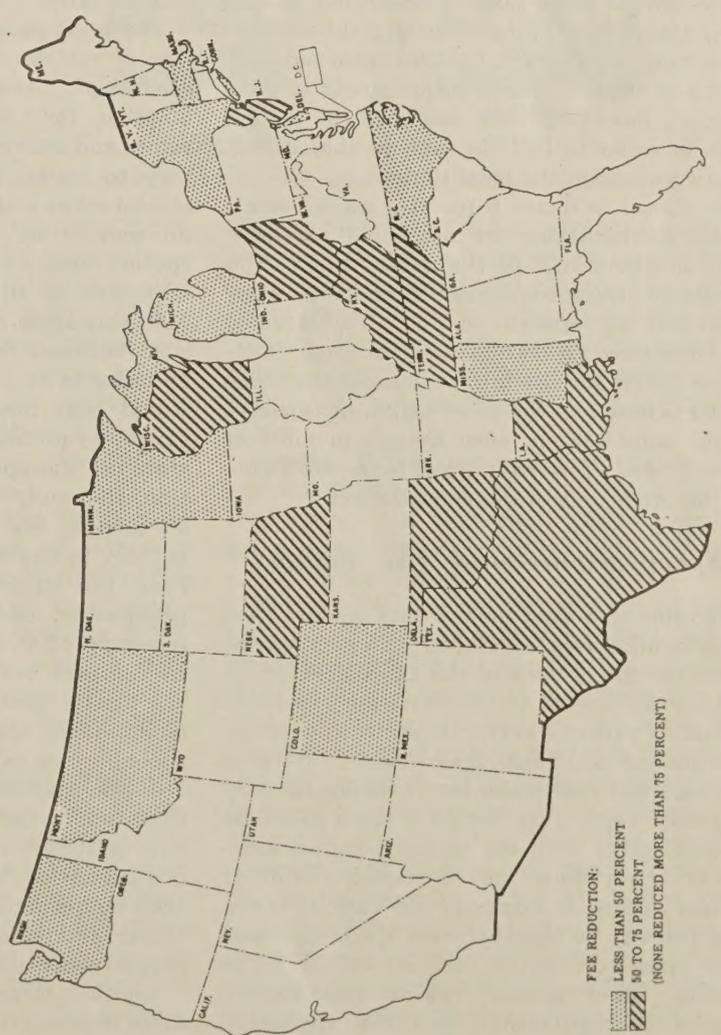


Figure 7.—Reduced registration fees for farm truck (No. 3, pickup truck).

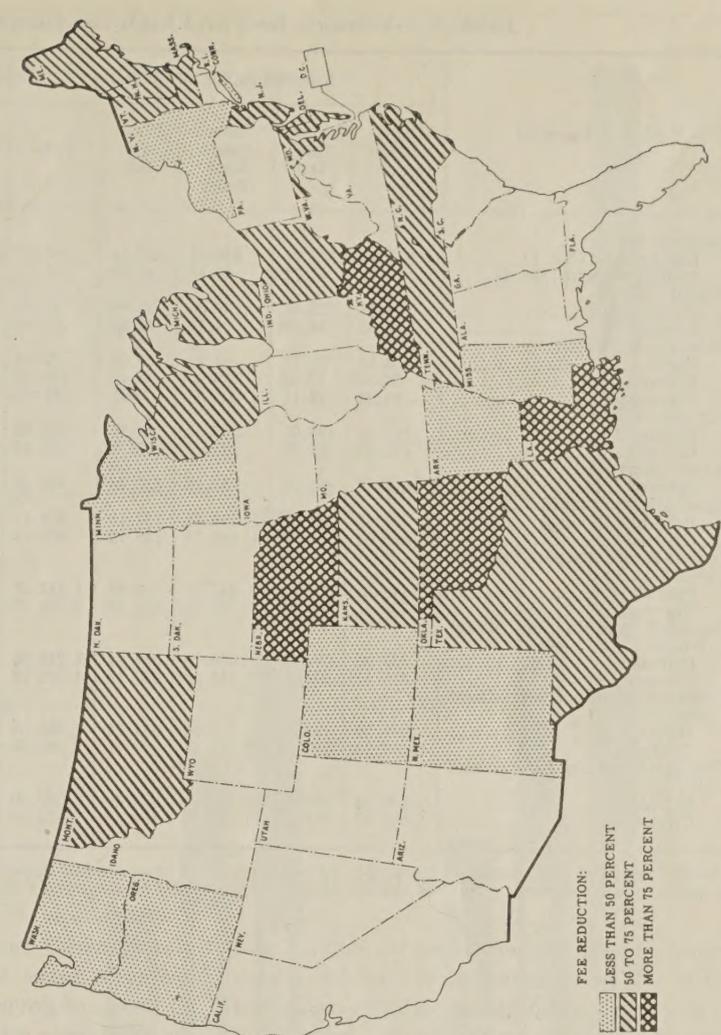


Figure 8.—Reduced registration fees for farm truck (No. 4, stake truck).

Table 3.—Average, low, and high road-user and property taxes on selected motor vehicles<sup>1</sup>

Vehicle and service	Average fee for all States					Lowest fee					Highest fee				
	Regis- tration fee, etc.	Motor- fuel tax	Total road- user taxes	Prop- erty tax	Total	Regis- tration fee, etc.	Motor- fuel tax	Total road- user taxes	Prop- erty tax	Total	Regis- tration fee, etc.	Motor- fuel tax	Total road- user taxes	Prop- erty tax	Total
Passenger car:															
Lightweight (No. 1)-----	\$13.43	\$33.21	\$46.64	\$28.14	\$61.57	\$3.00	\$17.28	\$28.28	(\$5.00)	\$38.04	\$31.61	\$40.32	\$67.91	\$52.07	\$99.59
Mediumweight (No. 2)-----	17.71	41.74	59.45	40.63	81.01	3.00	21.72	40.20	(8.00)	46.20	42.50	50.68	87.25	74.35	132.41
Pickup (No. 3):															
Farm-----	15.37	22.31	37.68	17.56	46.99	3.00	11.61	24.35	(2.84)	30.09	45.00	27.09	68.22	45.38	75.86
Private-----	19.56	34.59	54.15	24.23	67.00	5.00	18.00	33.00	(5.00)	46.00	45.00	42.00	81.00	45.38	100.94
Stake truck (No. 4):															
Farm-----	33.10	31.71	64.81	24.66	77.89	5.00	16.50	36.50	(4.97)	48.50	86.00	38.50	113.50	64.42	128.94
Private-----	58.50	76.85	135.35	33.47	153.11	15.00	39.99	59.99	(8.00)	84.51	141.55	93.31	221.53	64.42	253.88
Contract-----	95.20	128.11	223.31	33.47	241.07	25.00	66.66	132.88	(8.00)	149.88	328.17	155.54	461.49	64.42	461.49
Van (No. 5):															
Private-----	112.56	133.01	245.57	72.28	283.92	44.44	69.21	142.28	(18.91)	183.28	275.00	161.49	401.49	153.11	403.92
Contract-----	171.39	221.75	393.14	72.28	431.49	59.00	115.38	212.84	(18.91)	244.84	505.67	269.22	736.43	153.11	736.43
Dump (No. 6):															
Private-----	319.87	431.25	751.12	137.43	825.56	100.00	225.00	325.00	(25.46)	383.38	872.50	525.00	1,247.50	310.45	1,247.50
Three-axle combination (No. 7):															
Private-----	333.51	461.22	794.74	157.13	873.11	76.00	240.00	449.00	(45.00)	522.00	867.10	560.00	1,347.10	298.10	1,470.91
Contract-----	425.52	461.22	886.75	157.13	970.12	134.00	240.00	454.00	(45.00)	522.00	1,034.33	560.00	1,514.33	298.10	1,514.33
Four-axle combination, gasoline (No. 8):															
Private-----	486.15	860.94	1,347.08	182.83	1,442.31	76.00	450.00	755.00	(55.00)	882.00	1,717.66	1,050.00	2,617.66	356.05	2,772.88
Contract-----	635.11	860.94	1,496.05	182.83	1,591.27	160.00	450.00	760.00	(55.00)	882.00	1,893.83	1,050.00	2,793.83	356.05	2,793.83
Four-axle combination, diesel (No. 9):															
Private-----	529.91	594.57	1,099.70	257.14	1,233.63	76.00	300.00	555.00	(55.00)	682.00	2,533.70	900.00	2,533.70	521.76	2,533.70
Contract-----	675.47	594.57	1,245.26	257.14	1,379.19	160.00	300.00	560.00	(55.00)	682.00	2,533.70	900.00	2,611.83	521.76	2,611.83
Five-axle combination, diesel (No. 10):															
Private-----	851.30	899.38	1,750.68	384.71	1,943.03	151.00	595.76	895.76	(87.96)	1,189.64	2,601.92	1,340.46	3,495.56	691.86	3,797.17
Contract-----	1,113.92	899.38	2,013.31	384.71	2,205.66	296.00	595.76	919.76	(87.96)	1,189.64	2,845.33	1,340.46	3,887.91	691.86	3,887.91
Five-axle combination, diesel (No. 11):															
Private-----	1,190.24	919.76	2,110.00	454.40	2,337.20	239.90	651.16	1,053.85	(358.94)	1,313.64	3,042.96	1,139.53	4,019.70	673.00	4,378.64
Contract-----	1,666.77	919.76	2,586.53	454.40	2,813.73	336.90	651.16	1,283.95	(358.94)	1,313.64	3,164.17	1,139.53	4,303.70	673.00	4,378.64

<sup>1</sup> In 22 States and the District of Columbia, personal-property taxes are not imposed. In one State diesel fuel is not taxed directly. The average fees given are for the States where the respective taxes are collected. The fees in parentheses are the lowest for the same States.

specified, would be permitted to register and operate. Some instances were found in which the vehicle or combination might be registered but could not be operated legally with a full load. Even though they could be registered and might, in some cases, be operated on the highways of the State with slightly smaller gross weights, all such vehicles were omitted from the study. Minor adjustments of axle spacing, however, were assumed in a few cases in order to include vehicles that otherwise were within the legal limits.

As shown in figure 6 (p. 41), tractor-semi-trailer combinations are registered as single units in about half of the States and in the remainder, tractor-trucks and semitrailers are registered as separate units. Combinations are considered to be registered as single units where the fee for either the tractor or the semi-trailer is based on the gross weight or capacity of the combination, even though in most of these States a relatively small fee is also levied on the other unit of the combination.

### Specifications and Use Factors

In order to obtain the tax data on a uniform basis in all States, a detailed statement of the specifications of each of the 11 vehicles selected was submitted to the State authorities in the latter part of 1955 for determination of the specific fees and taxes that would be payable during a full year under laws existing January 1, 1956. Table 2 (p. 39) gives these specifications together with the assumed annual mileage traveled, motor fuel consumed, and other factors needed to compute the various taxes. The taxes to be reported were the State road-user taxes—on motor fuel, on vehicle registration, other annual vehicle fees closely related to registration, and the applicable

motor-carrier taxes—and all direct personal-property taxes levied on motor vehicles at all levels of government. The property taxes for 1956 were estimated by the State authorities on the basis of 1955 property valuations and tax rates.

The same care that was taken in the selection of vehicles was taken in the selection of use factors. Average values are not available, however, for the mileages, fuel-consumption rates, and earnings. It was therefore necessary to assign these values arbitrarily, but special effort was made to select amounts that are reasonable. The objective was to supply specific factors to which rates could be applied uniformly in all States, and to present data reflecting these rates to permit valid comparisons between States, vehicles, and services. In order to avoid the complex situations that would have been encountered in computing taxes on vehicles in interstate operation, intrastate use was specified. Without this stipulation, the study would have been impractical. Obviously, few large combinations travel entirely in one State for a whole year. However, the stipulation of intrastate travel is permissible, even indispensable, when it is remembered that the purpose of the study is to compare tax rates rather than to select the most typical vehicles, or the most probable amount and kind of service or the most probable tax payments.

It was specified that the vehicles had been operated in the same State since purchased new in 1954. This made 1956 the third year of registration, thus excluding from the study such nonrecurring taxes as those on sales and titling, and removing the vehicles from the top property-tax brackets.

Another large group of taxes omitted are those imposed by the Federal Government on

gasoline, oil, vehicles, and accessories and parts, which yielded over \$2.9 billion in 1955. Although newly enacted Federal highway legislation now earmarks much of the revenue from these taxes, they were in the past identical in nature with taxes levied on tobacco, cosmetics, and so forth, and were collected on the products whether they were used for highway or nonhighway purposes. In any case, their exclusion has no effect on comparison between States of the data presented in this article since the levies are uniform throughout the Nation.

The data received from the States are presented in tables 4-13. In all of these tables (except table 13) the States are arranged in regional groupings that permit ready comparison of data for each State with those of its neighbors.

The national averages and extremes are shown in table 3. The averages are simple unweighted averages of the totals for all States where the vehicles are permitted. In the case of property taxes, they are averages reflecting only the States where such taxes are levied. Figure 9 gives a quick graphic comparison of the low, average, and high annual rates on four of the vehicles covered in the study. Figures 11-20 show graphically the principal groups of taxes, and permit quick comparisons between the elements reported, and between the States.

### Property Taxes

In most States property taxes on motor vehicles have little or no direct relation to the use of highways, and the revenues from them are not available for highways. They are, however, so closely associated with registration fees in their application and their relation

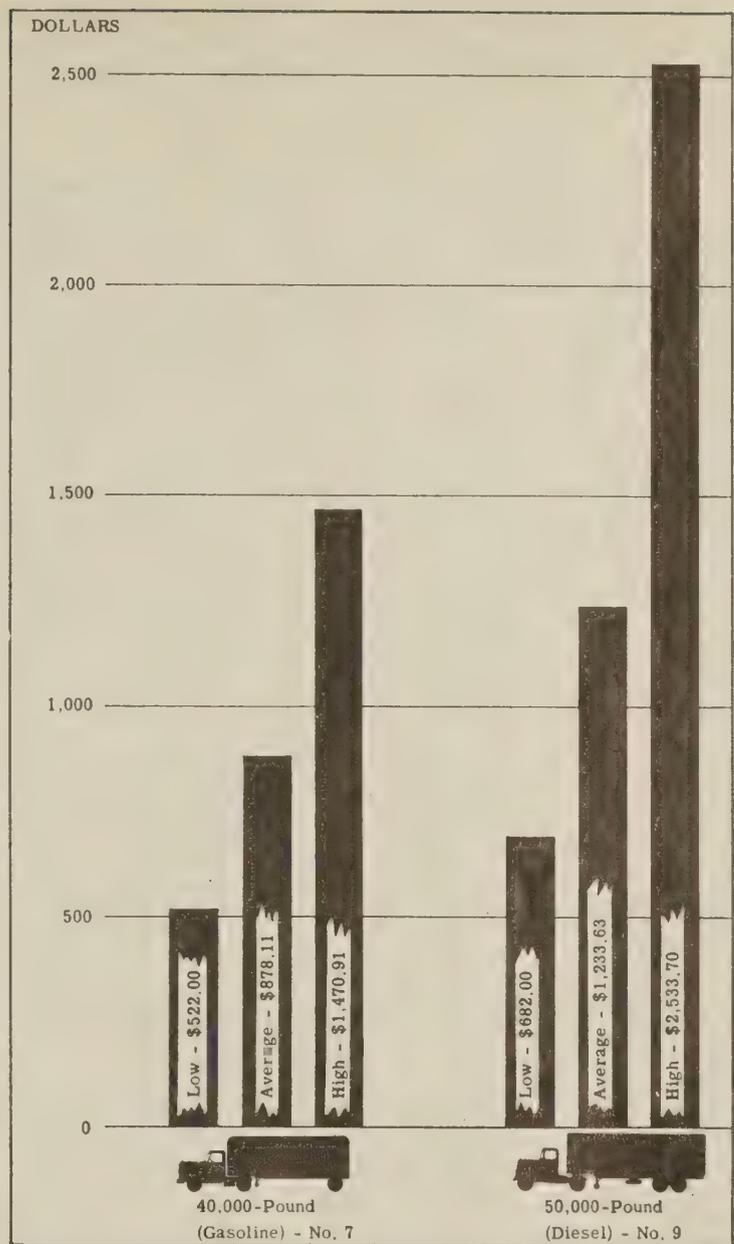
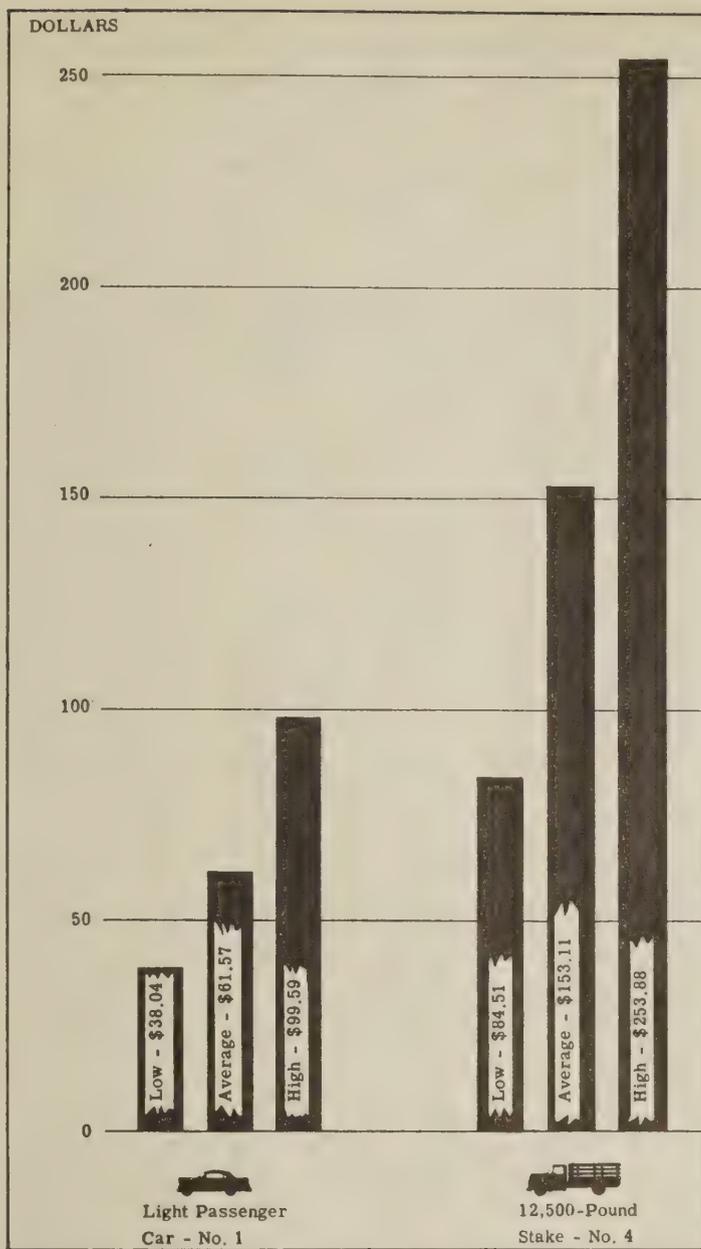


Figure 9.—Annual rates of low, high, and average taxes (road-user and property) on selected vehicles in private operation.

to costs of operation and comprise such a large portion of the total taxes paid on motor vehicles in some States, that their inclusion was necessary in order to obtain equitable comparisons. The registration fees for individual vehicles vary considerably among the States, and property taxes in some instances greatly exceed the registration fees paid; but when property taxes and registration fees are considered together, the differences among the States are smaller in most instances.

Figure 4 shows the States in which State or local property taxes are levied and the States in which registration fees are in lieu of ad valorem or property taxes. In this connection it should be noted that the registration fees of quite a few States are based, at least in part, on the age or valuation of the vehicle. Louisiana permits local property taxes to be levied in addition to the registration fee, but the application of such levies is not general in the State. The relation of property taxes to registration fees and total taxes on motor vehicles is shown in tables 4-13.

The valuation of motor vehicles for tax purposes is generally conceded to be much closer to market value than is the valuation of other personal property (household furnish-

ings, for instance) subject to the same taxes. It is also probable that motor vehicles constitute a substantial portion of taxable personal property in many jurisdictions. Therefore, although this study is not directly concerned with personal-property taxes per se, the total tax burden on the motor vehicle must not be neglected either by those concerned solely with highway finance, or in research in broader fields of public finance.

The registration fee for the lightweight passenger car in Pennsylvania, as shown in table 4, is \$10, more than twice as much as the \$4.50 levied by Massachusetts. In Pennsylvania, however, the flat registration fee of \$10, that applies to all automobiles, is in lieu of all other ad valorem taxes, whereas in Massachusetts vehicles are subject to property taxes in addition to registration fees. The addition of the \$39.50 property tax to the \$4.50 registration fee yields a total of \$44, which is 4.4 times as much as the Pennsylvania registration fee, and far greater than the registration fee alone for any State. Oklahoma, Iowa, North Dakota, and Vermont, all with registration fees in excess of \$25, appear at first glance to be exacting greater taxes on the lightweight automobile than other States. Yet in none

of these States is there a property tax on motor vehicles, and when property taxes and registration fees are combined, the total in a great many States exceeds the fees of the four mentioned. Although only a few of the States are pointed out here as examples, many other significant comparisons can be made from the tables.

Another factor that demonstrates the close relation between registration fees and property taxes is the reduction of the registration fee in several States according to the age (and value) of the vehicle.

The property taxes that are given in tables 4-13, for all except the farm vehicles, include all taxes levied by the State, county, city, or other local governmental unit in which the vehicle is domiciled, and are the taxes that would be imposed on the vehicles in the capital city of the State. The property taxes given for farm vehicles include State, county, and district or other property taxes that would be collected in an average rural agricultural community in the State. In a few States where uniform statewide valuation and tax rates are in effect in all jurisdictions, there is no difference between property taxes on farm vehicles and those registered in the State capital.

Table 4.—Road-user and personal-property taxes on selected passenger vehicles (Nos. 1 and 2)

State	Lightweight passenger car (No. 1)						Mediumweight passenger car (No. 2)								
	Regis- tration fee	Property tax	Other taxes and fees	Gasoline tax	Total	Rank of State		Regis- tration fee	Property tax	Other taxes and fees	Gasoline tax	Total	Rank of State		
						Total fees and taxes	Total, excluding property tax						Total fees and taxes	Total, excluding property tax	
New England:															
Maine	\$14.00	\$22.38	-----	\$40.32	\$76.70	8	10	\$16.00	\$31.94	-----	\$50.68	\$98.62	12	13	
New Hampshire	15.50	-----	\$16.11	28.80	60.41	25	6	19.50	-----	\$23.00	36.20	78.70	26	6	
Vermont	26.00	-----	-----	31.68	57.68	28	7	26.00	-----	-----	39.82	65.82	38	16	
Massachusetts	4.50	39.50	-----	28.80	72.80	11	47	9.00	56.50	-----	36.20	101.70	9	44	
Rhode Island	12.00	24.18	-----	23.04	59.22	27	43	16.00	40.30	-----	28.96	85.26	18	45	
Connecticut	8.00	33.82	-----	34.56	76.38	9	31	8.00	49.40	-----	43.44	100.84	10	36	
Middle Atlantic:															
New York	15.00	-----	-----	23.04	38.04	49	42	19.75	-----	-----	28.96	48.71	47	40	
New Jersey	15.00	-----	-----	23.04	38.04	48	41	25.00	-----	-----	28.96	53.96	43	30	
Pennsylvania	10.00	-----	-----	34.56	44.56	44	26	10.00	-----	-----	43.44	53.44	46	33	
Delaware	10.00	-----	-----	28.80	38.80	47	40	10.00	-----	-----	36.20	46.20	49	43	
Maryland	10.00	5.00	-----	34.56	49.56	40	24	15.00	8.00	-----	43.44	66.44	37	22	
District of Columbia	22.00	-----	1.00	34.56	57.56	29	8	32.00	-----	1.00	43.44	76.44	28	7	
West Virginia	17.00	11.64	-----	34.56	63.20	21	15	22.40	14.55	-----	43.44	80.39	25	15	
Southeastern:															
Virginia	10.00	27.28	-----	34.56	71.84	13	27	10.00	51.48	-----	43.44	104.92	8	34	
North Carolina	10.00	28.04	-----	40.32	78.36	7	20	12.00	42.78	-----	50.68	105.46	7	18	
South Carolina	4.00	41.14	-----	40.32	85.46	4	28	6.00	54.86	-----	50.68	111.54	4	26	
Georgia	3.00	26.91	-----	37.44	67.35	15	35	10.00	35.53	-----	47.06	92.59	14	24	
Florida	15.00	-----	.25	40.32	55.57	32	9	20.00	-----	.25	50.68	70.93	34	9	
Kentucky	4.50	35.82	.50	40.32	81.14	5	22	4.50	50.75	.50	50.68	106.43	5	27	
Tennessee	9.50	-----	-----	40.32	49.82	39	21	13.00	-----	-----	50.68	63.68	39	17	
Alabama	3.00	15.41	.75	40.32	59.48	26	29	3.00	18.76	.75	50.68	73.19	32	29	
Mississippi	12.48	45.42	-----	40.32	98.22	2	11	16.57	65.16	-----	50.68	132.41	1	12	
East Central:															
Ohio	10.25	-----	-----	28.80	39.05	46	39	10.25	-----	-----	36.20	46.45	48	42	
Indiana	11.00	52.07	-----	23.04	86.11	3	44	12.00	74.35	-----	28.96	115.31	3	48	
Illinois	10.50	21.81	-----	28.80	61.11	24	38	22.00	34.90	-----	36.20	93.10	13	23	
Michigan	10.50	-----	-----	34.56	45.06	42	23	13.30	-----	-----	43.44	56.74	42	25	
Wisconsin	16.00	-----	-----	34.56	50.56	38	17	16.00	-----	-----	43.44	59.44	41	21	
Minnesota	23.20	-----	.25	28.80	52.25	35	13	39.00	-----	.25	36.20	75.45	29	8	
Iowa	29.00	-----	-----	34.56	63.56	19	4	38.00	-----	-----	43.44	81.44	24	5	
Missouri	11.00	19.85	-----	17.28	48.13	41	49	25.00	28.02	-----	21.72	74.74	30	41	
Southwestern:															
Arkansas	13.00	15.19	-----	37.44	65.63	16	18	19.00	21.56	-----	47.06	87.62	16	14	
Louisiana	3.00	-----	-----	40.32	43.32	45	30	3.00	-----	-----	50.68	53.68	44	31	
Oklahoma	30.47	-----	-----	37.44	67.91	14	1	40.19	-----	-----	47.06	87.25	17	1	
Texas	11.16	16.93	-----	28.80	56.89	31	37	18.74	23.61	-----	36.20	78.55	27	28	
West Central:															
North Dakota	27.50	-----	-----	34.56	62.06	23	5	38.50	-----	-----	43.44	81.94	23	4	
South Dakota	22.00	-----	-----	28.80	50.80	37	16	33.00	-----	-----	36.20	69.20	36	11	
Nebraska	8.00	29.37	-----	34.56	71.93	12	32	8.00	40.57	-----	43.44	92.01	15	37	
Kansas	13.15	34.25	-----	28.80	76.20	10	33	15.95	48.64	-----	36.20	100.79	11	35	
Mountain:															
Montana	10.00	49.27	-----	40.32	99.59	1	19	10.00	70.33	-----	50.68	131.01	2	20	
Idaho	17.50	-----	-----	34.56	52.06	36	14	17.50	-----	-----	43.44	60.94	40	19	
Wyoming	5.00	21.48	-----	28.80	55.28	33	46	5.00	30.66	-----	36.20	71.86	33	47	
Colorado	5.60	21.48	1.00	34.56	62.64	22	34	6.95	30.66	1.00	43.44	82.05	22	38	
New Mexico	18.00	-----	-----	34.56	52.56	34	12	26.00	-----	-----	43.44	69.44	35	10	
Arizona	4.00	24.20	-----	28.80	57.00	30	48	4.00	34.40	-----	36.20	74.60	31	49	
Utah	5.00	29.56	-----	28.80	63.36	20	45	5.00	41.82	-----	36.20	83.02	20	46	
Nevada	5.50	39.60	-----	34.56	79.66	6	36	5.50	56.85	-----	43.44	105.79	6	39	
Pacific:															
Washington	5.00	-----	21.40	37.44	63.84	18	3	5.00	-----	30.40	47.06	82.46	21	3	
Oregon	10.00	-----	-----	34.56	44.56	43	25	10.00	-----	-----	43.44	53.44	45	32	
California	8.00	-----	23.00	34.56	65.56	17	2	8.00	-----	32.00	43.44	83.44	19	2	

In two States—California and Washington—property taxes on motor vehicles have been replaced by “in lieu” taxes. These taxes have many characteristics of property taxes, but since neither the levies nor the distribution of their proceeds are directly related to the jurisdiction in which they were collected, they have been classified as road-user imposts. In both of these instances the State courts have ruled them not to be property taxes.

### Types of Service

Distinctly different tax rates are in effect in most States for commercial vehicles operated privately (not for hire), as contract carriers (for hire), and in farm service. Information was therefore obtained and tabulated separately for all vehicles in private operation, for the pickup and stake trucks (Nos. 3-4) in farm service, and for the stake and van trucks (Nos. 4-5) and all combinations (Nos. 7-11) in contract carrier service.

Vehicles in private operation are those used solely for carrying goods owned or sold by the vehicle owner, with no direct transportation charge.

Contract carriers are those employed in hauling goods for others, with a direct transportation charge, at times and to destinations required by the jobs for which they are hired. Operation of contract carriers is usually subject to State franchise and regulation. Common carriers, which operate for hire over established routes and on fixed schedules, are not included in the study because of their more complex tax schedules and forms of regulation, and the fact that their operation is predominantly interstate.

The farm-service classification includes vehicles registered at a reduced fee without restriction as to the highways they may use. Provision for reduced fees for farm trucks, in various forms, is in effect in 27 States. (Farm vehicles registered by some States at a nominal charge imposed as the sole registration fee and licensed for restricted operation on or in the immediate vicinity of the farm are not included in this study.)

### Farm Service

Provision for registration of farm trucks at half the regular fee for private trucks is com-

mon but, as shown in tables 5 and 6, some States do not allow reductions that great, and some allow considerably more. The reductions for farm vehicles vary not only among the States but also vary somewhat for vehicles of different capacities, as may be seen from a comparison of figures 7 and 8 (p. 41). Large numbers of farm trucks are in the lighter weight groups, and what may at first glance appear to be relatively minor concessions in registration fees can, in fact, be of major importance from a revenue standpoint, particularly in predominantly agricultural States. In four States, as indicated in figure 8, the 12,500-pound stake truck (No. 4), if classified as a farm truck, is allowed a reduction of more than 75 percent in registration fee, in 15 States the reduction is from 50 to 75 percent, and only 8 of the States allowing a reduction place it below 50 percent.

A comparison of the regular and farm registration fees for vehicle No. 4 in each State is shown in figure 10. In Nebraska the regular registration fee for vehicle No. 4 is \$90, but a farmer can register the same truck for \$12. In Kentucky, farm trucks of 22,000 pounds or less can be registered for \$4.50 but

Table 5.—Road-user and personal-property taxes on a pickup truck, 4,800 pounds gross vehicle weight (No. 3)

State	Farm service						Private operation								
	Regis- tration fee	Property tax	Other taxes and fees	Gasoline tax	Total	Rank of State		Regis- tration fee	Property tax	Other taxes and fees	Gasoline tax	Total	Rank of State		
						Total fees and taxes	Total, excluding property tax						Total fees and taxes	Total, excluding property tax	
New England:															
Maine.....	\$15.00	\$19.53	-----	\$27.09	\$61.62	7	11	\$15.00	\$19.53	-----	\$42.00	\$76.53	11	17	
New Hampshire.....	19.50	-----	\$14.06	19.35	52.91	12	3	19.50	-----	\$14.06	30.00	63.56	30	10	
Vermont.....	26.00	-----	-----	21.28	47.28	24	7	26.00	-----	-----	33.00	59.00	36	14	
Massachusetts.....	12.00	34.50	-----	19.35	65.85	4	37	15.00	34.50	-----	30.00	79.50	9	42	
Rhode Island.....	18.00	16.70	-----	15.48	50.18	17	30	18.00	25.89	-----	24.00	67.89	20	45	
Connecticut.....	14.40	26.80	-----	23.22	64.42	5	20	14.40	30.40	-----	36.00	80.80	8	31	
Middle Atlantic:															
New York.....	17.50	-----	-----	15.48	32.98	45	34	25.00	-----	-----	24.00	49.00	47	34	
New Jersey.....	15.00	-----	1.00	15.48	31.48	47	36	30.00	-----	1.00	24.00	55.00	39	21	
Pennsylvania.....	16.50	-----	-----	23.22	39.72	36	17	16.50	-----	-----	36.00	52.50	42	25	
Delaware.....	11.50	-----	-----	19.35	30.85	48	40	17.50	-----	-----	30.00	47.50	48	38	
Maryland.....	12.00	5.00	-----	23.22	40.22	33	26	12.00	5.00	-----	36.00	53.00	41	35	
District of Columbia.....	44.00	-----	1.00	23.22	68.22	2	1	44.00	-----	1.00	36.00	81.00	7	1	
West Virginia.....	20.00	7.56	-----	23.22	50.78	16	9	20.00	10.18	-----	36.00	66.18	26	19	
Southeastern:															
Virginia.....	12.00	13.20	-----	23.22	48.42	21	27	12.00	20.62	-----	36.00	68.62	17	37	
North Carolina.....	10.00	10.14	-----	27.09	47.23	25	22	20.00	20.29	-----	42.00	82.29	6	11	
South Carolina.....	6.00	12.15	-----	27.09	45.24	28	33	6.00	28.48	-----	42.00	76.48	12	36	
Georgia.....	5.00	22.33	-----	25.16	52.49	13	42	5.00	22.33	-----	39.00	66.33	25	43	
Florida.....	24.75	-----	.25	27.09	52.09	15	4	24.75	-----	.25	42.00	67.00	21	5	
Kentucky.....	4.50	16.00	.50	27.09	48.09	23	35	10.00	43.78	.50	42.00	96.28	3	24	
Tennessee.....	9.50	-----	-----	27.09	36.59	40	24	25.00	-----	-----	42.00	67.00	22	6	
Alabama.....	15.00	9.66	.50	27.09	52.25	14	10	15.00	15.41	.50	42.00	72.91	13	16	
Mississippi.....	7.00	12.99	-----	27.09	47.08	26	29	10.00	45.37	-----	42.00	97.37	2	28	
East Central:															
Ohio.....	17.35	-----	-----	19.35	36.70	39	23	36.95	-----	-----	30.00	66.95	23	7	
Indiana.....	15.00	45.38	-----	15.48	75.86	1	41	15.00	45.38	-----	24.00	84.38	5	47	
Illinois.....	20.00	13.82	-----	19.35	53.17	11	18	20.00	18.54	-----	30.00	68.54	18	32	
Michigan.....	16.50	-----	-----	23.22	39.72	35	16	29.70	-----	-----	36.00	65.70	27	9	
Wisconsin.....	10.00	-----	-----	23.22	33.22	44	32	35.00	-----	-----	36.00	71.00	15	3	
Minnesota.....	20.40	-----	.25	19.35	40.00	34	15	25.00	-----	.25	30.00	55.25	38	20	
Iowa.....	25.00	-----	-----	23.22	48.22	22	6	25.00	-----	-----	36.00	61.00	33	12	
Missouri.....	15.00	9.68	-----	11.61	36.29	41	48	15.00	18.68	-----	18.00	51.68	46	49	
Southwestern:															
Arkansas.....	12.00	8.25	-----	25.16	45.41	27	21	12.00	12.25	-----	39.00	63.25	31	30	
Louisiana.....	3.00	-----	-----	27.09	30.09	49	43	10.00	-----	-----	42.00	52.00	44	27	
Oklahoma.....	10.10	-----	-----	25.16	35.26	42	25	20.50	-----	-----	39.00	59.50	35	13	
Texas.....	9.60	2.84	-----	19.35	31.79	46	45	19.20	14.41	-----	30.00	63.61	29	33	
West Central:															
North Dakota.....	21.00	-----	-----	23.22	44.22	29	8	21.00	-----	-----	36.00	57.00	37	18	
South Dakota.....	22.50	-----	-----	19.35	41.85	31	12	22.50	-----	-----	30.00	52.50	43	26	
Nebraska.....	8.00	7.78	-----	23.22	39.00	38	39	17.50	17.14	-----	36.00	70.64	16	23	
Kansas.....	10.00	28.30	-----	19.35	57.65	8	44	10.00	31.51	-----	30.00	71.51	14	46	
Mountain:															
Montana.....	14.00	26.52	-----	27.09	67.61	3	13	16.00	42.94	-----	42.00	100.94	1	15	
Idaho.....	17.50	-----	-----	23.22	40.72	32	14	17.50	-----	-----	36.00	53.50	40	22	
Wyoming.....	5.00	18.74	-----	19.35	43.09	30	49	5.00	18.74	7.50	30.00	61.24	32	44	
Colorado.....	7.00	18.74	1.00	23.22	49.96	18	38	8.75	18.74	1.00	36.00	64.49	28	40	
New Mexico.....	16.00	-----	-----	23.22	39.22	37	19	16.00	-----	-----	36.00	52.00	45	29	
Arizona.....	15.55	21.00	-----	19.35	55.90	9	28	15.55	21.00	-----	30.00	66.55	24	41	
Utah.....	7.50	23.07	-----	19.35	49.92	19	47	7.50	23.07	-----	30.00	60.57	34	48	
Nevada.....	5.50	25.75	-----	23.22	54.47	10	46	5.50	25.75	25.00	36.00	92.25	4	8	
Pacific:															
Washington.....	9.75	-----	14.95	25.16	49.86	20	5	14.50	-----	14.95	39.00	68.45	19	4	
Oregon.....	10.00	-----	-----	23.22	33.22	43	31	10.00	-----	-----	36.00	46.00	49	39	
California.....	22.00	-----	19.00	23.22	64.22	6	2	22.00	-----	19.00	36.00	77.00	10	2	

a \$134 registration fee is required for a 22,000-pound vehicle in private use. In 1954, more than 54 percent of Nebraska's trucks and in Kentucky, over 39 percent, were registered at reduced farm rates. Similar situations exist in other States but in most the reductions are not as great. In New Hampshire, for example, a farm truck of less than 16,000 pounds may be registered at a flat fee of \$25, but since this is greater than the regular fee of \$19.50 for a pickup truck having a gross weight of 4,800 pounds, the farm rate is of no advantage to the owner of the pickup. Consequently, only 5 percent of the total truck registrations in New Hampshire are in the farm classification.

In 1954, 20 States were able to report farm truck registrations separately. In 3 of the States that did so, farm trucks constituted more than half of all trucks registered and farm trucks exceeded 30 percent of all trucks in 13 States. In considering the equity of special reduced rates for farm trucks, it should be remembered that farm trucks probably average fewer miles per year than other trucks. The reductions are not as great on a cents-per-mile basis as may appear from the com-

parisons in tables 5 and 6 and in figures 7 and 8.

### Carrier Taxes

In consideration of motor-carrier service, the gross receipts taxes and other levies that are imposed on general business, and not limited to motor carriers, have been eliminated. Fees for authority to operate, and other fees paid only at the time a carrier begins to haul goods for hire, have also been excluded.

The point at which a road-user tax becomes a "carrier tax" is becoming ever more difficult to determine. Care should be taken in comparing the carrier taxes of the several States. Many of the States have special registration classes for vehicles used in contract (for hire) service. The fees in the special registration classes, in most cases, are substantially greater than the registration fees for vehicles in private (not-for-hire) service. The difference, while technically classed as part of the registration fee, is in reality a special carrier fee. There is, of course, the justifying factor that vehicles in carrier service usually operate a much greater mileage than those in private

use, thus reducing the per-mile cost of their registration fees.

The majority of trucks are used for the ordinary private service of carrying goods owned or sold by the vehicle owner, and for which there is no direct transportation charge. Even these trucks, however, are subject to mileage or other carrier taxes under some conditions, and the variations in the tax structures of the States made it necessary in a few instances to make arbitrary decisions on the inclusion or exclusion of these special levies.

The general policy followed was to include only the taxes that must be paid on almost all of the vehicles in a given group. For example, the laws of some States are so written that practically all vehicles of more than 1½ tons (manufacturer's rated capacity) must pay certain mileage or compensatory taxes, whether in private or contract operation. In the same States many vehicles of 1½-ton capacity or less are not subject to the tax. In such cases the tax has been shown only for the heavier vehicles. It should be remembered that the purpose of the study is to present a comparison of tax rates and



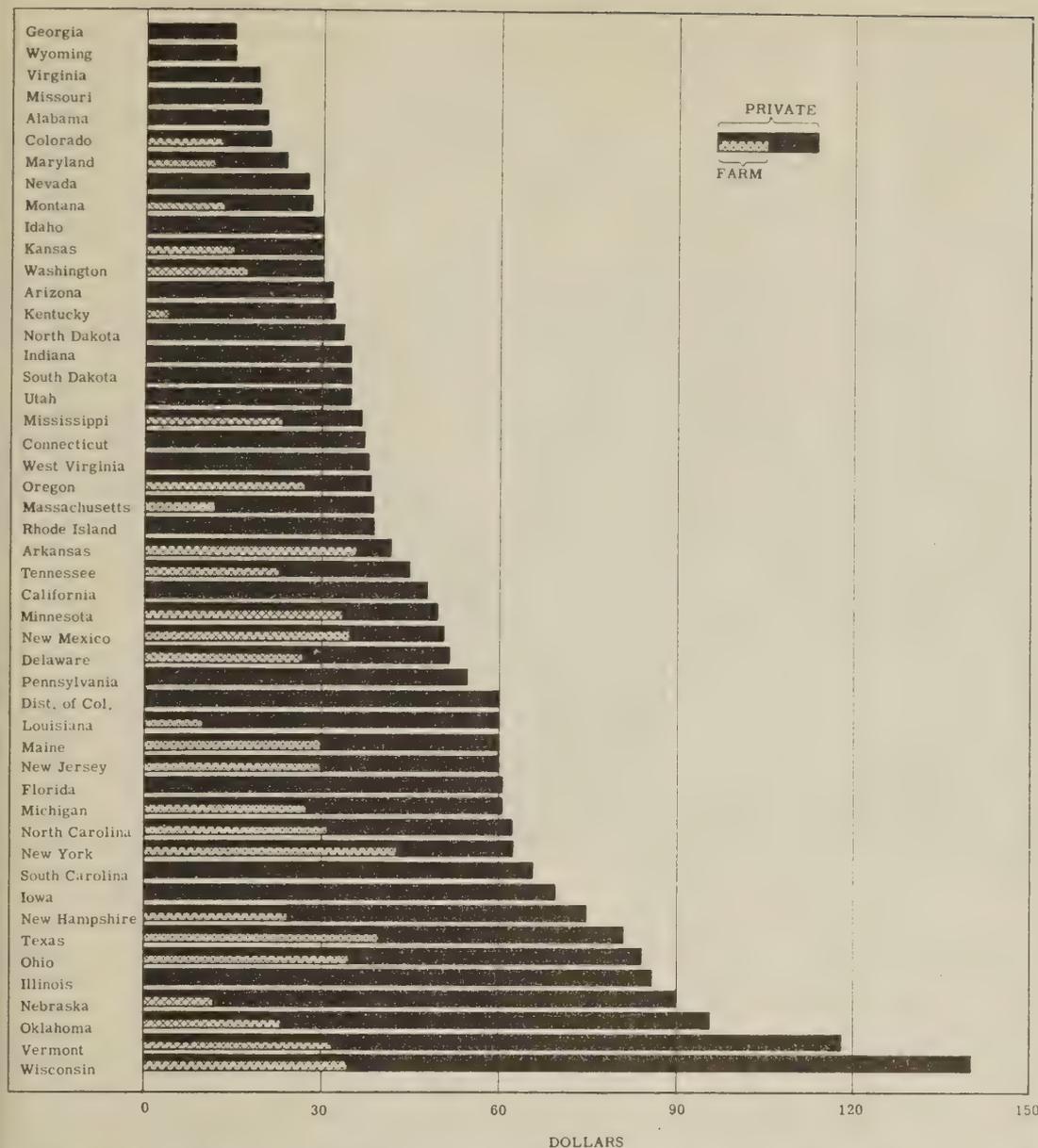


Figure 10.—Comparison of private operation and farm service registration fees on a 12,500-pound stake truck (No. 4).

burdens on certain typical vehicles rather than to include all taxes on all vehicles. Undoubtedly many of the larger trucks traveling in interstate commerce are subject to greater taxes than are reported in this study, and are also subject to additional restrictions and regulations. The larger units apparently have certain offsetting economic advantages, however, or they would not be in use.

### Mileage Taxes

Classification and treatment of mileage taxes is something of a problem. Historically, road-user taxes have been subdivided by most authorities into three major groups. The first and most important group consists of fuel taxes and miscellaneous fees incidental to fuel taxation. The second major group, usually termed motor-vehicle revenues, consists of motor-vehicle registration fees and other fees, some of which are not paid annually, such as title fees, drivers' licenses, and other revenues of relatively minor importance. The third group of road-user revenues, motor-carrier taxes, consists of special taxes on for-hire carriers. This last group of taxes has in recent years come to be known as "third

structure," a term that is either disliked or rejected by some authorities on highway finance, but it is being used.

These groupings have, in the past, afforded adequate classification of road-user revenues, although there are borderline instances in which there is considerable question as to proper classification. Most common among these is the annual registration fee in States that levy higher plate fees on for-hire carriers. Should the difference between the registration fee in private and for-hire operation be classed as a carrier tax? It has not previously been so classed, under the theory that carriers' vehicles, as a rule, can be expected to operate more miles than vehicles in private operation, and that the higher registration fee for carriers' vehicles serves as an adjustment for the greater mileage.

Another instance of borderline classification is the special fee charged diesel-powered vehicles. An argument can be made for classification of these additional registration fees as fuel taxes. But the important matter is the fairness of the State's tax system, and this is judged primarily on the total taxes levied on any vehicle, provided, of course, that the methods of reporting or collecting the tax do

not in themselves impose additional burdens of record keeping or other requirements not reflected in the actual amounts of taxes paid.

The previous article published in 1953 suggested that we may be witnessing the development of a field of highway taxation—mileage and ton-mile taxes—that should not be placed in any of the three historical groups. At that time Idaho, New York, and Oregon had mileage taxes that could not be classed as fuel taxes, as registration fees, or as carrier taxes. Since that time the Idaho tax has been substantially modified, but Colorado and Ohio have joined New York and Oregon in the group of States that have mileage taxes that are avowed attempts to obtain revenues based almost entirely on the vehicles and their use and that make little distinction between operation for profit as a transportation facility and operation incidental to the conduct of any other enterprise. Highway authorities and students of highway and general public finance have shown much interest in these mileage taxes. It is not an exaggeration to say that mileage taxes are at present the subject of more interest and perhaps controversy than any other phase of motor-vehicle taxation.

Mileage taxes may prove to have two great advantages: They should yield considerable amounts of revenue and they should, in theory at least, be imposed at rates that take into account the value of service received and the costs of providing the service. Mileage taxes also have at least two major disadvantages. The most important of these, from the States' point of view, is the cost of administration. The cost of establishing and maintaining complete records, weight stations, and an enforcement staff is substantial and consumes a relatively greater proportion of the revenue collected than do the other two basic revenue producers—the gasoline tax and registration fees. The maintenance of records for filing of reports required under a mileage tax certainly constitutes a substantial burden on the vehicle owner over and above the actual amount of tax paid.

### Administration and Application

While this study is based primarily on legislation, it is appropriate to call attention to administration and enforcement as they affect vehicle taxation. The interpretation and application of road-user taxes in one State as compared with another having similar tax laws may easily result in substantial tax differences on similar vehicles in similar service. Rigid insistence that vehicles be registered for the full weights they actually carry (not to be confused with size and weight limit enforcement) would undoubtedly increase the registration revenues of some States. Practices are understood to vary considerably in this respect. In comparing road-user taxes in different States, it is pertinent to examine practices and interpretations in the application of existing statutes. In preparing this article no allowance was made for such differences.

The payment of motor-fuel taxes is another item that merits close examination. Practically all persons familiar with highway finance agree that some of the gasoline used on the

Table 7.—Road-user and personal-property taxes on a single-unit van truck, 19,000 pounds gross vehicle weight (No. 5)

State	Private operation							Contract carrier									
	Regis- tration fee	Prop- erty tax	Other taxes and fees	Mileage or ton- mile tax	Gasol- ine tax	Total	Rank of State		Regis- tration fee	Prop- erty tax	Other taxes and fees	Carrier taxes and fees	Mileage or ton- mile tax	Gasol- ine tax	Total	Rank of State	
							Total fees and taxes	Total, excl. prop. tax								Total fees and taxes	Total, excl. prop. tax
New England:																	
Maine.....	\$125.00	\$65.79	---	---	\$161.49	\$352.28	9	12	\$125.00	\$65.79	---	\$30.00	---	\$269.22	\$490.01	15	18
New Hampshire.....	114.00	---	\$47.37	---	115.35	276.72	24	15	114.00	---	\$47.37	2.00	---	192.30	355.67	38	30
Vermont.....	199.50	---	---	---	126.88	326.38	14	6	199.50	---	---	---	---	211.53	411.03	24	20
Massachusetts.....	57.00	118.00	---	---	115.35	290.35	20	44	57.00	118.00	---	15.00	---	192.30	382.30	31	44
Rhode Island.....	54.00	83.39	---	---	92.28	229.67	41	48	54.00	83.39	---	5.00	---	153.84	296.23	45	49
Connecticut.....	57.00	145.92	---	---	138.42	341.34	12	39	57.00	145.92	---	5.00	---	230.76	438.68	21	40
Middle Atlantic:																	
New York.....	95.00	---	---	\$67.50	92.28	254.78	29	22	95.00	---	---	---	\$112.50	153.84	361.34	35	28
New Jersey.....	90.00	---	1.00	---	92.28	183.28	49	41	90.00	---	1.00	---	---	153.84	244.84	49	46
Pennsylvania.....	90.00	---	---	---	138.42	228.42	42	26	90.00	---	---	---	---	230.76	320.76	42	35
Delaware.....	81.90	---	---	---	115.35	197.25	46	37	81.90	---	---	---	---	192.30	274.20	47	43
Maryland.....	75.00	20.00	---	---	138.42	233.42	40	32	75.00	20.00	---	---	---	230.76	325.76	40	38
District of Columbia.....	74.00	---	1.00	---	138.42	213.42	45	33	74.00	---	1.00	---	---	230.76	305.76	44	39
West Virginia.....	84.50	18.91	---	---	138.42	241.83	37	29	84.50	18.91	---	23.50	---	230.76	357.67	36	32
Southeastern:																	
Virginia.....	45.60	69.47	---	---	138.42	253.49	31	40	45.60	69.47	---	240.00	---	230.76	585.83	7	8
North Carolina.....	152.00	52.03	---	---	161.49	365.52	6	8	266.00	52.03	---	---	---	269.22	587.25	6	6
South Carolina.....	126.00	94.95	---	---	161.49	382.44	4	11	126.00	94.95	---	150.00	---	269.22	640.17	2	5
Georgia.....	55.00	66.78	---	---	149.96	271.74	26	36	110.00	66.78	---	25.00	---	249.99	451.77	19	26
Florida.....	84.70	---	.25	---	161.49	246.44	33	24	84.70	---	.25	.50	250.00	269.22	604.67	4	2
Kentucky.....	112.00	103.48	.75	---	161.49	377.72	5	18	45.00	103.48	.50	126.00	---	269.22	544.20	10	15
Tennessee.....	240.00	---	---	---	161.49	401.49	2	1	315.00	---	---	12.50	---	269.22	596.72	5	3
Alabama.....	50.00	25.46	.50	---	161.49	237.45	39	34	50.00	25.46	.50	125.00	---	269.22	470.18	17	14
Mississippi.....	94.00	90.12	---	---	161.49	345.61	10	21	187.00	90.12	---	13.00	---	269.22	559.34	8	12
East Central:																	
Ohio.....	143.85	---	---	---	115.35	259.20	28	20	143.85	---	---	20.00	---	192.30	356.15	37	29
Indiana.....	50.00	153.11	---	---	92.28	295.39	18	49	50.00	153.11	---	24.00	---	153.84	380.95	32	47
Illinois.....	159.00	44.71	---	---	115.35	319.06	16	17	159.00	44.71	---	---	---	192.30	396.01	26	31
Michigan.....	107.80	---	---	---	138.42	246.22	34	25	107.80	---	---	---	50.00	230.76	388.56	28	24
Wisconsin.....	215.00	---	---	---	138.42	353.42	8	3	215.00	---	---	10.00	---	230.76	455.76	18	13
Minnesota.....	80.00	---	.25	---	115.35	195.60	47	38	80.00	---	.25	7.50	---	192.30	280.05	46	41
Iowa.....	190.00	---	---	---	138.42	328.42	13	5	190.00	---	---	5.00	---	230.76	425.76	23	17
Missouri.....	80.00	37.36	---	---	69.21	186.57	48	47	80.00	37.36	---	25.00	---	115.38	257.74	48	48
Southwestern:																	
Arkansas.....	67.00	32.10	---	---	149.96	249.06	32	30	67.00	32.10	---	---	---	249.99	349.09	39	37
Louisiana.....	120.00	---	---	---	161.49	281.49	22	14	240.00	---	---	10.00	---	269.22	519.22	12	7
Oklahoma.....	145.50	---	---	---	149.96	295.46	17	10	145.50	---	---	2.25	---	249.99	397.74	25	22
Texas.....	133.00	46.78	---	---	115.35	295.13	19	23	133.00	46.78	---	11.00	---	192.30	383.08	30	33
West Central:																	
North Dakota.....	46.25	---	40.00	---	138.42	224.67	44	28	46.25	---	40.00	55.00	---	230.76	372.01	33	27
South Dakota.....	90.00	---	185.00	---	115.35	390.35	3	2	90.00	---	---	10.00	---	192.30	477.30	16	11
Nebraska.....	165.00	39.17	---	---	138.42	342.59	11	9	165.00	39.17	---	15.00	---	230.76	449.93	20	21
Kansas.....	50.00	89.05	---	---	115.35	254.40	30	46	75.00	89.05	---	10.00	---	192.30	366.35	34	42
Mountain:																	
Montana.....	50.00	144.92	---	---	161.49	356.41	7	35	50.00	144.92	---	70.00	---	269.92	534.84	11	23
Idaho.....	55.00	---	---	89.25	138.42	282.67	21	13	55.00	---	---	---	148.75	230.76	434.51	22	16
Wyoming.....	40.00	63.16	2.50	57.56	115.35	278.57	23	31	40.00	63.16	---	2.50	95.94	192.30	393.90	27	34
Colorado.....	43.44	63.16	1.00	---	138.42	246.02	35	42	17.50	63.16	1.00	---	232.75	230.76	545.17	9	10
New Mexico.....	88.80	---	---	---	138.42	227.22	43	27	88.80	---	---	---	---	230.76	319.56	43	36
Arizona.....	54.05	71.20	---	---	115.35	240.60	38	45	54.05	71.20	---	300.00	---	192.30	617.55	3	4
Utah.....	65.00	64.89	---	---	115.35	245.24	36	43	65.00	64.89	---	---	---	192.30	322.19	41	45
Nevada.....	38.50	75.40	151.60	---	138.42	403.92	1	4	38.50	75.40	---	151.60	---	230.76	496.26	14	19
Pacific:																	
Washington.....	75.00	---	42.30	---	149.96	267.26	27	19	75.00	---	42.30	18.00	---	249.99	385.29	29	25
Oregon.....	53.90	---	---	127.50	138.42	319.82	15	7	53.90	---	---	---	212.50	230.76	497.16	13	9
California.....	75.00	---	63.00	---	138.42	276.42	25	16	75.00	---	63.00	367.67	---	230.76	736.43	1	1

highways escapes taxation (by means of refunded taxes), and that the amounts vary greatly between States. There is no way of knowing how much revenue escapes through excessive refund claims, but it is probable that the total is considerable.

For example, the stipulation in this study for the lightweight automobile is 9,500 miles of annual travel at 16.5 miles per gallon, with total gasoline consumption of 576 gallons for the year. Yet the average for all vehicles in one State was less than 576 gallons in both 1953 and 1954. This undoubtedly had much to do with the State legislature's conclusion that taxation of ownership is a more certain source of revenue than taxation of use, as evidenced by the increase in fees for registration of lightweight and mediumweight cars to \$25 and \$35, respectively, and elimination of reduced fees for farm trucks.

Another subject for scrutiny is the collection of diesel-fuel taxes. There are numerous ways of avoiding or evading the tax on diesel fuel, and State authorities charged with collecting it are in general agreement that a considerable amount escapes taxation. The authorities feel that the situation is improving,

but the fact that kerosene and some heating oils can be used as diesel fuel makes it seem probable that collection of the tax will remain an administrative problem for some time.

### Summary of Comparisons

The foregoing discussion has been of general subjects rather than specific vehicles, except for the remarks on farm rates. It is impractical to include in this article a full discussion of each of the tables and charts presented, but there are comparisons and items of special interest in connection with each of the vehicles that do merit being called to attention.

*Vehicle No. 1, lightweight passenger car* (table 4; fig. 11).—Registration fees for the lightweight passenger car range from \$3 to \$30.47, and total road-user taxes from \$28.28 to \$67.91. Since this vehicle is assumed to use 576 gallons of gasoline a year, each cent of a State's gasoline-tax rate amounts to a levy of \$5.76 during the course of a year, or 11 cents a week. The lowest gasoline-tax rate costs the owner of the lightweight passenger car 33 cents a week, the highest about 78 cents a week.

There are 11 States with property taxes alone that exceed the total of the road-user taxes paid in the State ranking lowest. (The property tax shown is for the State capital, however, and undoubtedly exceeds the average for the State in most cases.)

There are only 14 States in which the total road-user taxes on this lightweight automobile exceed \$52 per year, or \$1 per week. In the State with the highest road-user taxes on this vehicle, the annual amount is \$67.91, a little less than 19 cents per day. In the State with the lowest road-user tax rate on the lightweight automobile (\$28.28), these taxes amount to a little less than 8 cents per day.

*Vehicle No. 2, mediumweight passenger car* (table 4).—The mediumweight and lightweight passenger cars are representative of far more than half of all vehicles on the highways. Taxation of automobiles receives less attention than taxation of heavier commercial units, but automobiles, because of their vast number, contribute substantially more in road-user taxes.

Differences between the road-user taxes on lightweight automobiles and on those of medium weight are not great. The registra-

# LIGHTWEIGHT PASSENGER CAR (No. 1)

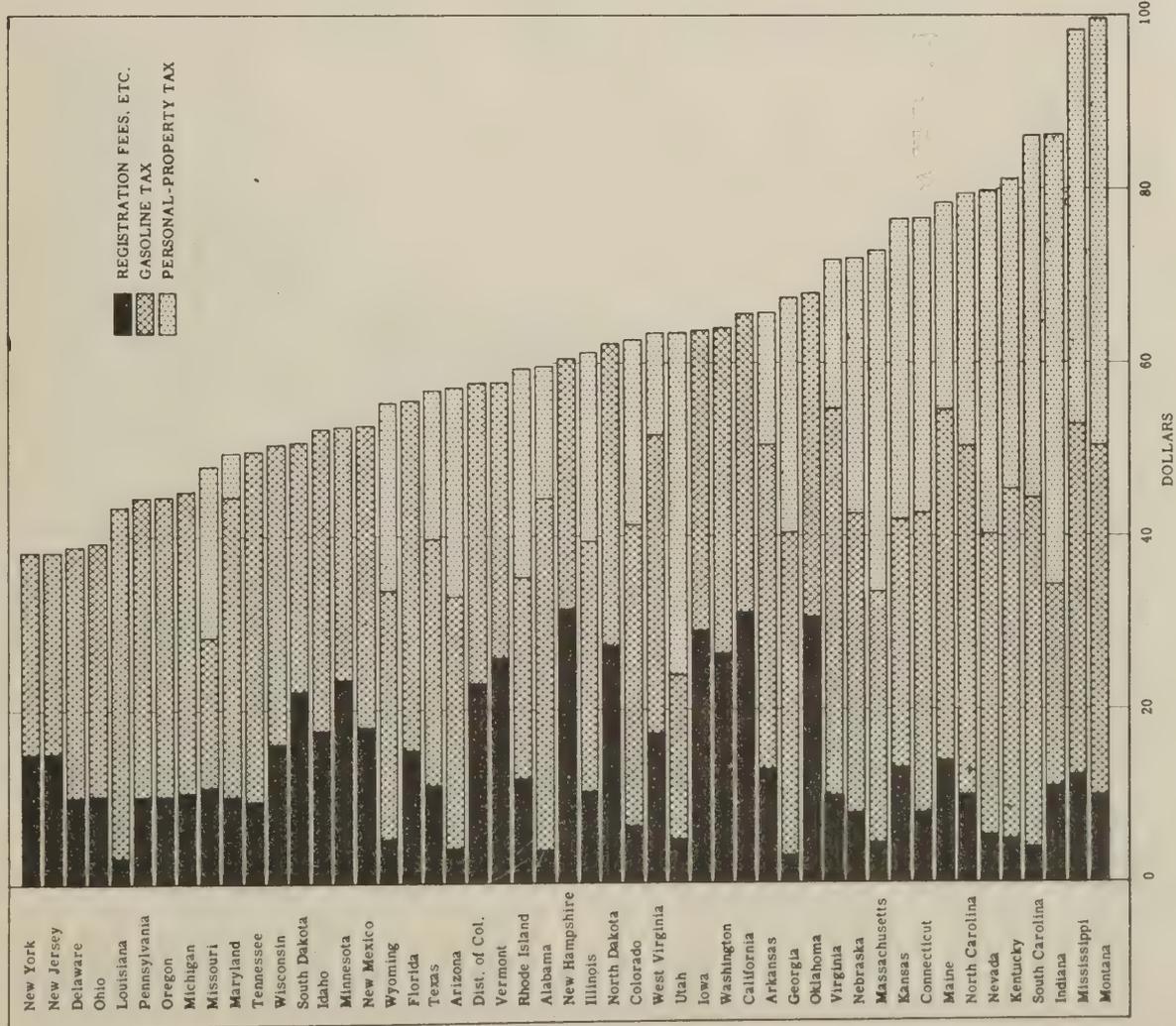
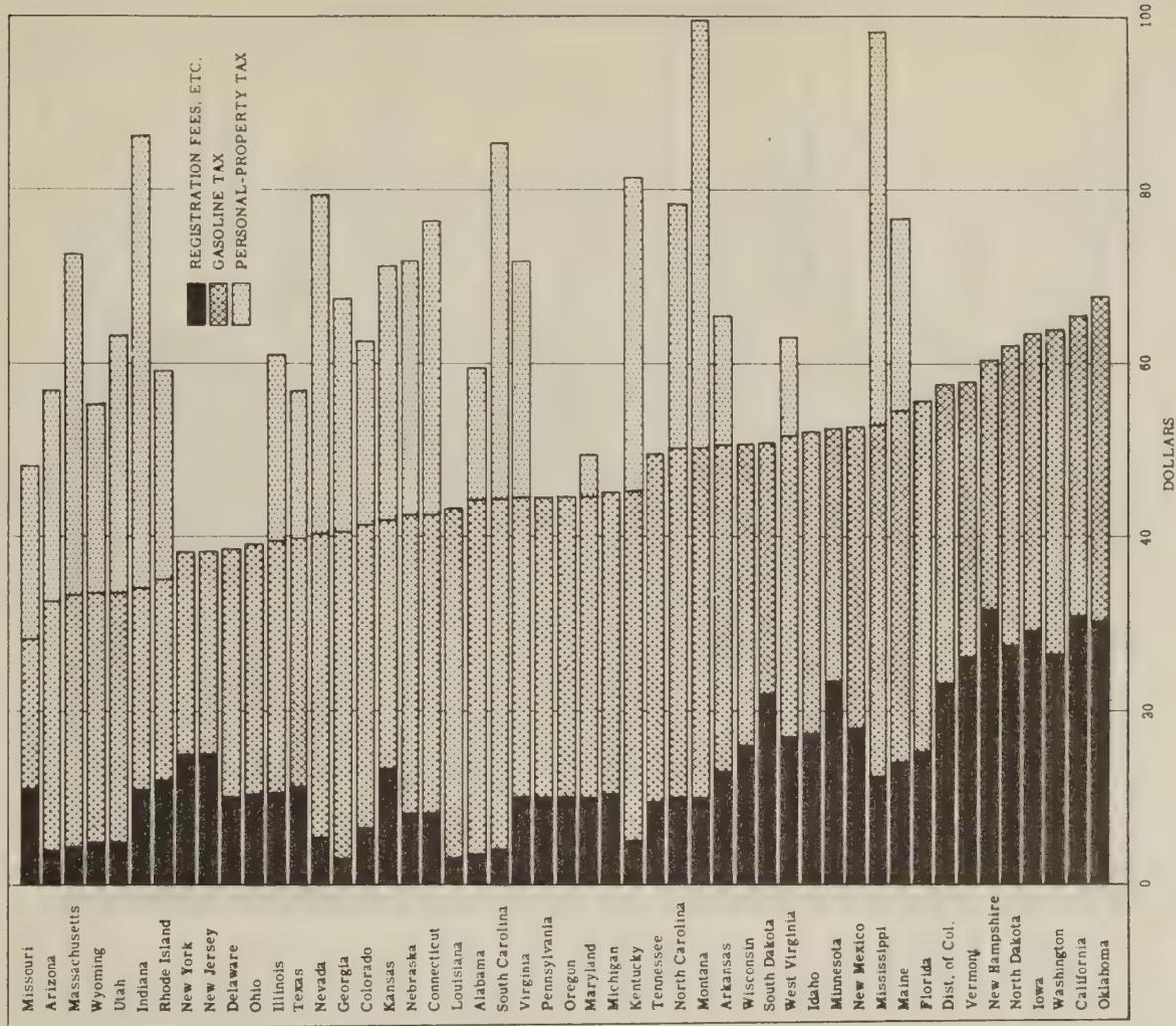


Figure 11.—State road-user and personal-property taxes on a lightweight passenger car (No. 1), ranked according to total taxes (left) and road-user taxes (right).

PICKUP TRUCK (No. 3)

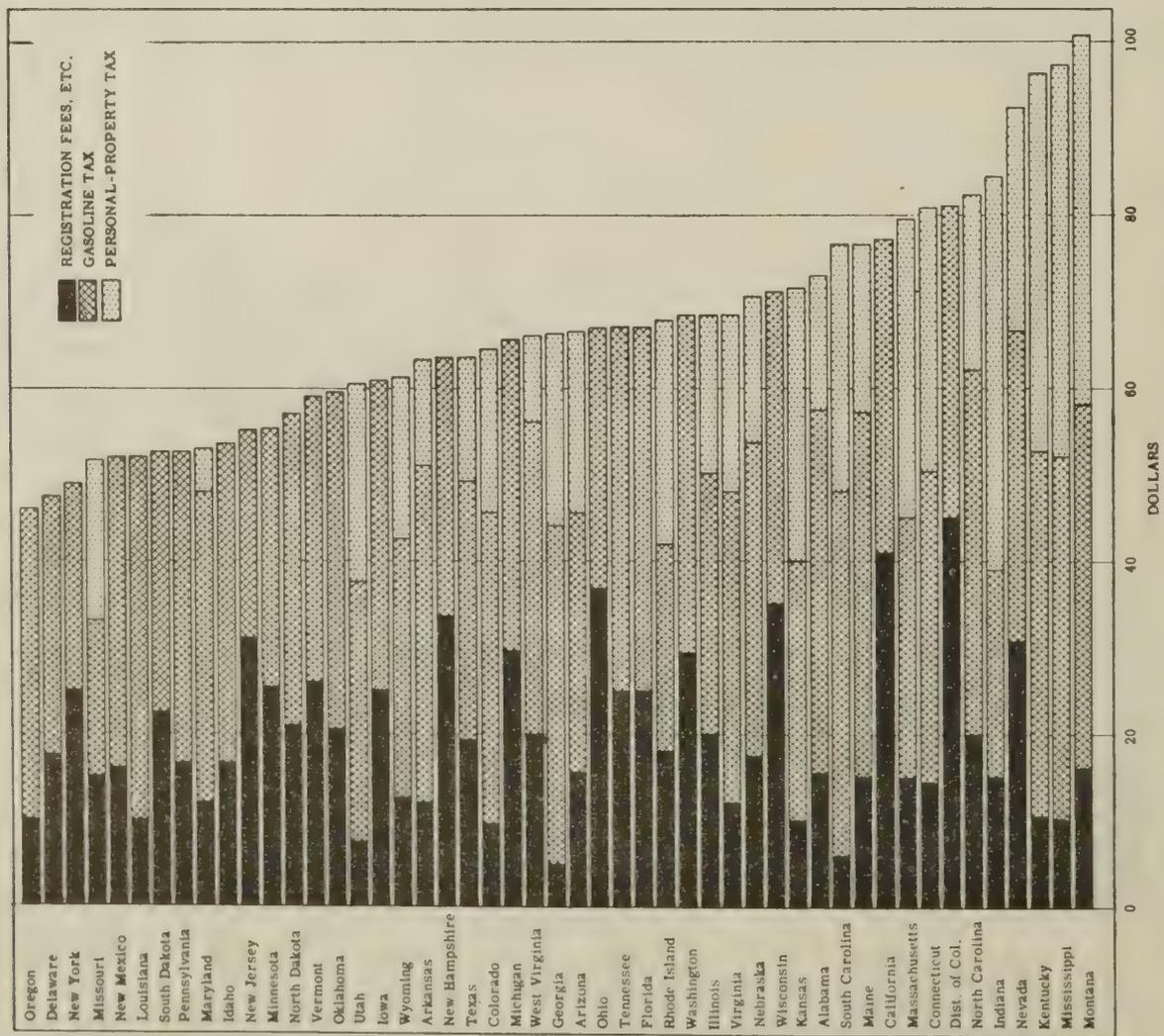
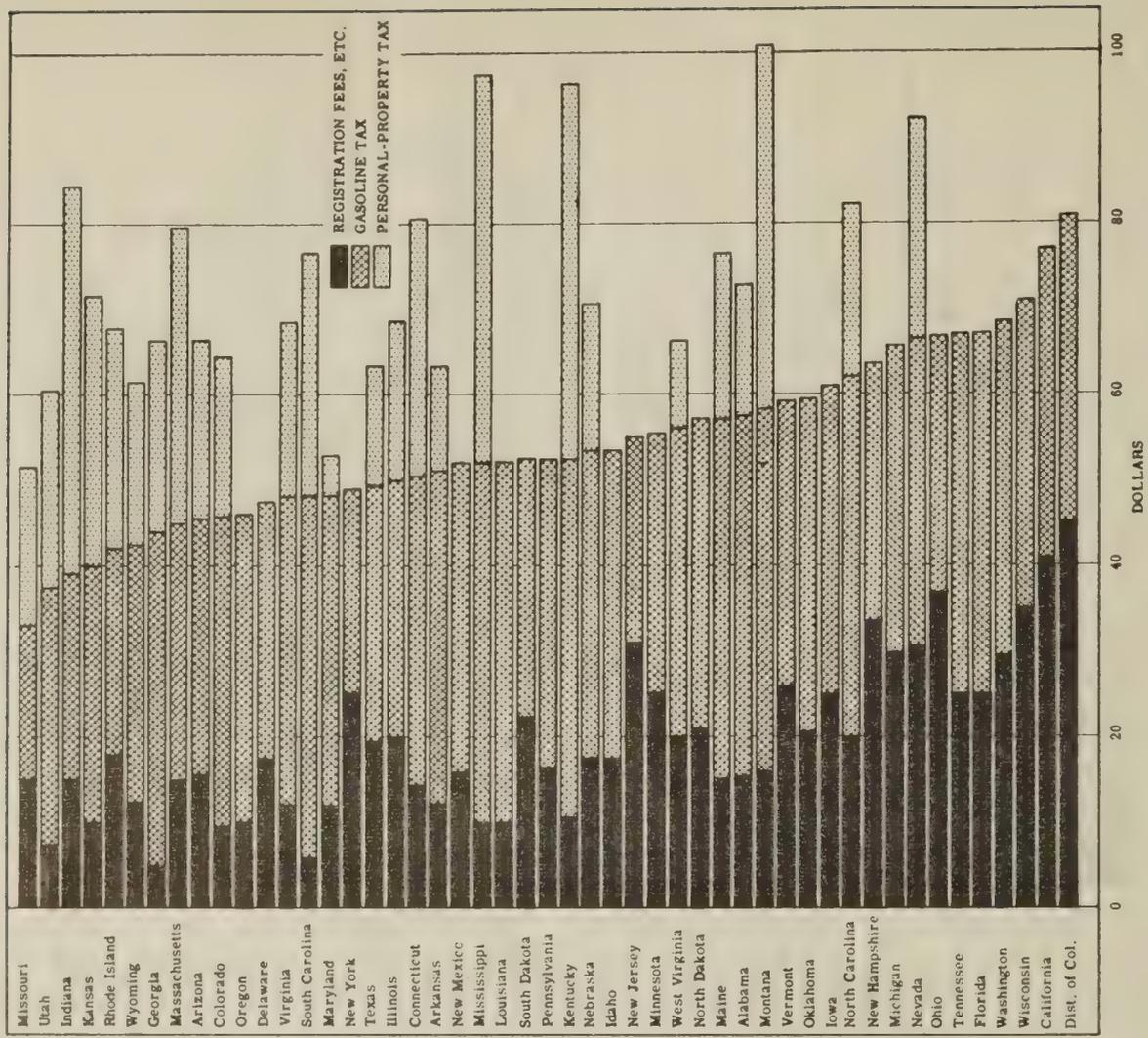


Figure 12.—State road-user and personal-property taxes on a pickup truck (No. 3) in private use, ranked according to total taxes (left) and road-user taxes (right).

12,500-POUND STAKE TRUCK (No. 4)

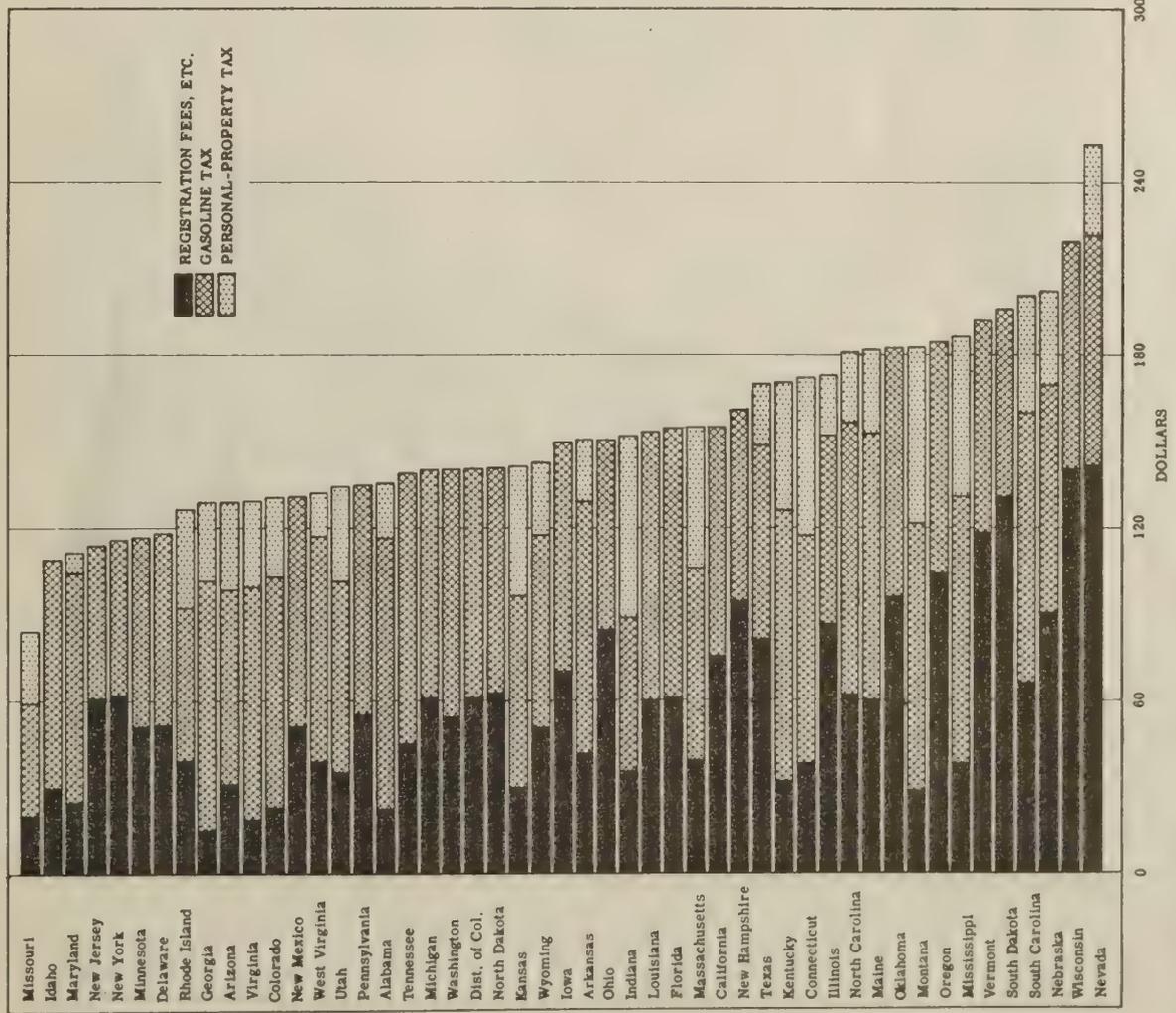
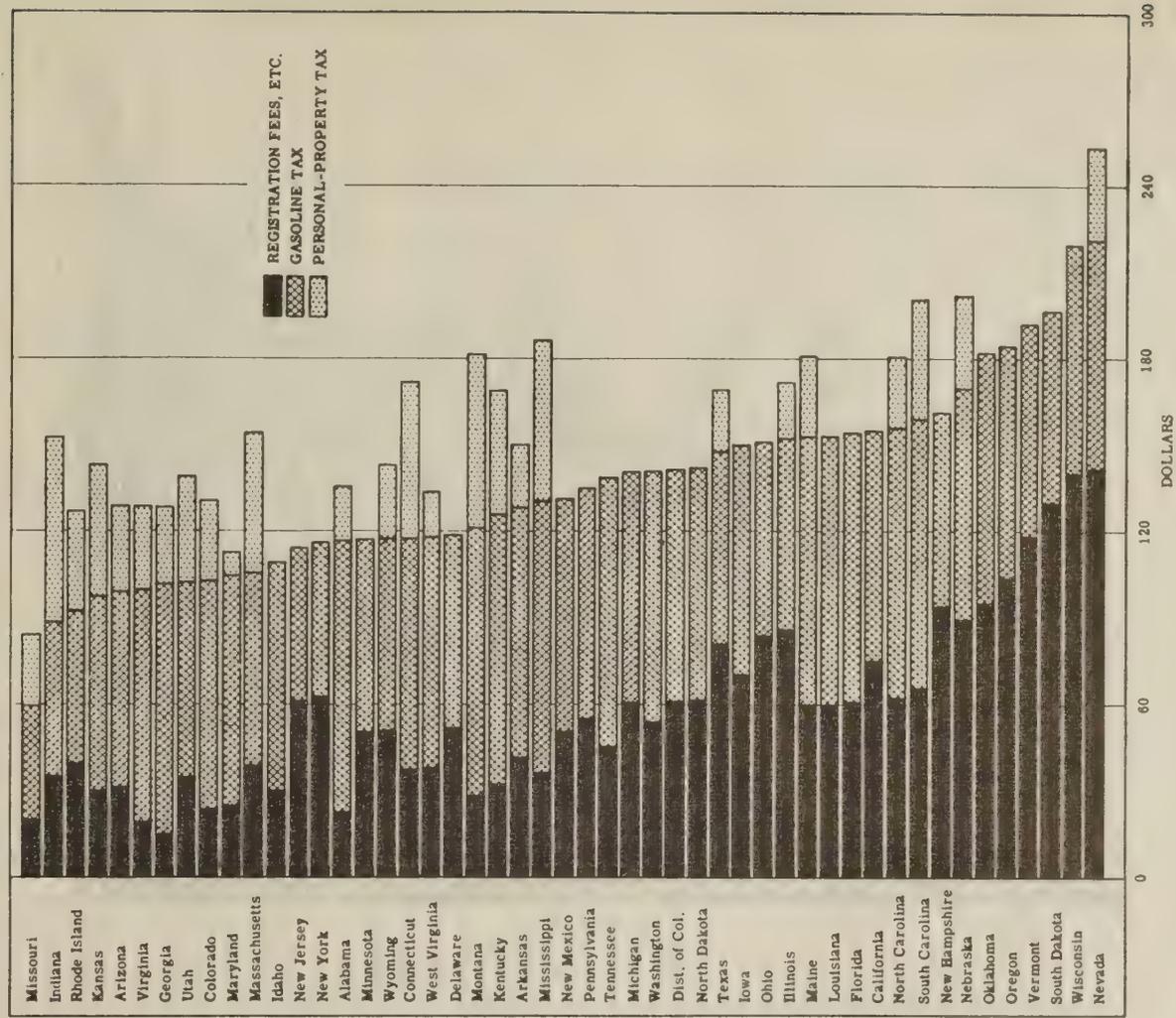


Figure 13.—State road-user and personal-property taxes on a 12,500-pound stake truck (No. 4) in private use, ranked according to total taxes (left) and road-user taxes (right).

19,000-POUND VAN TRUCK (No. 5)

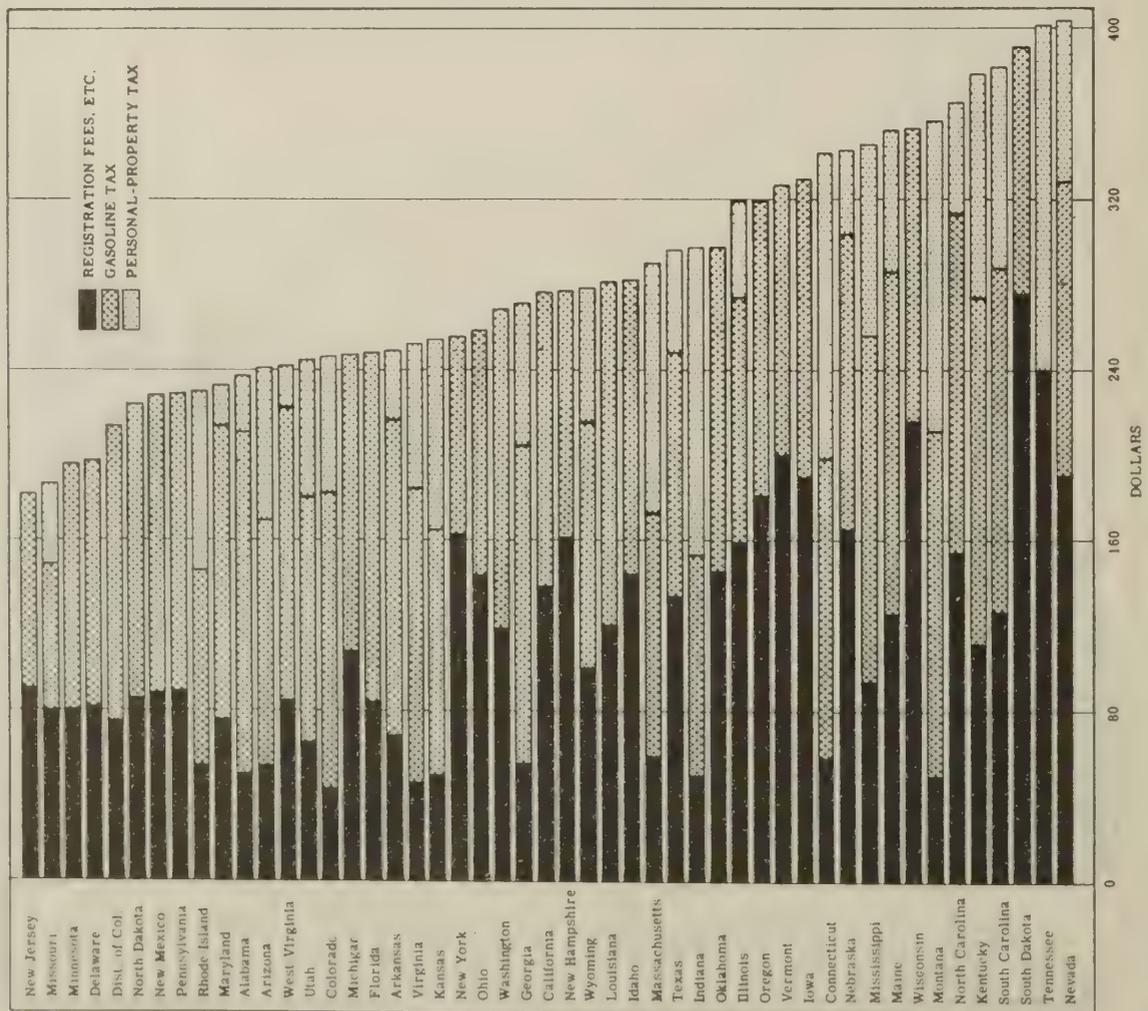
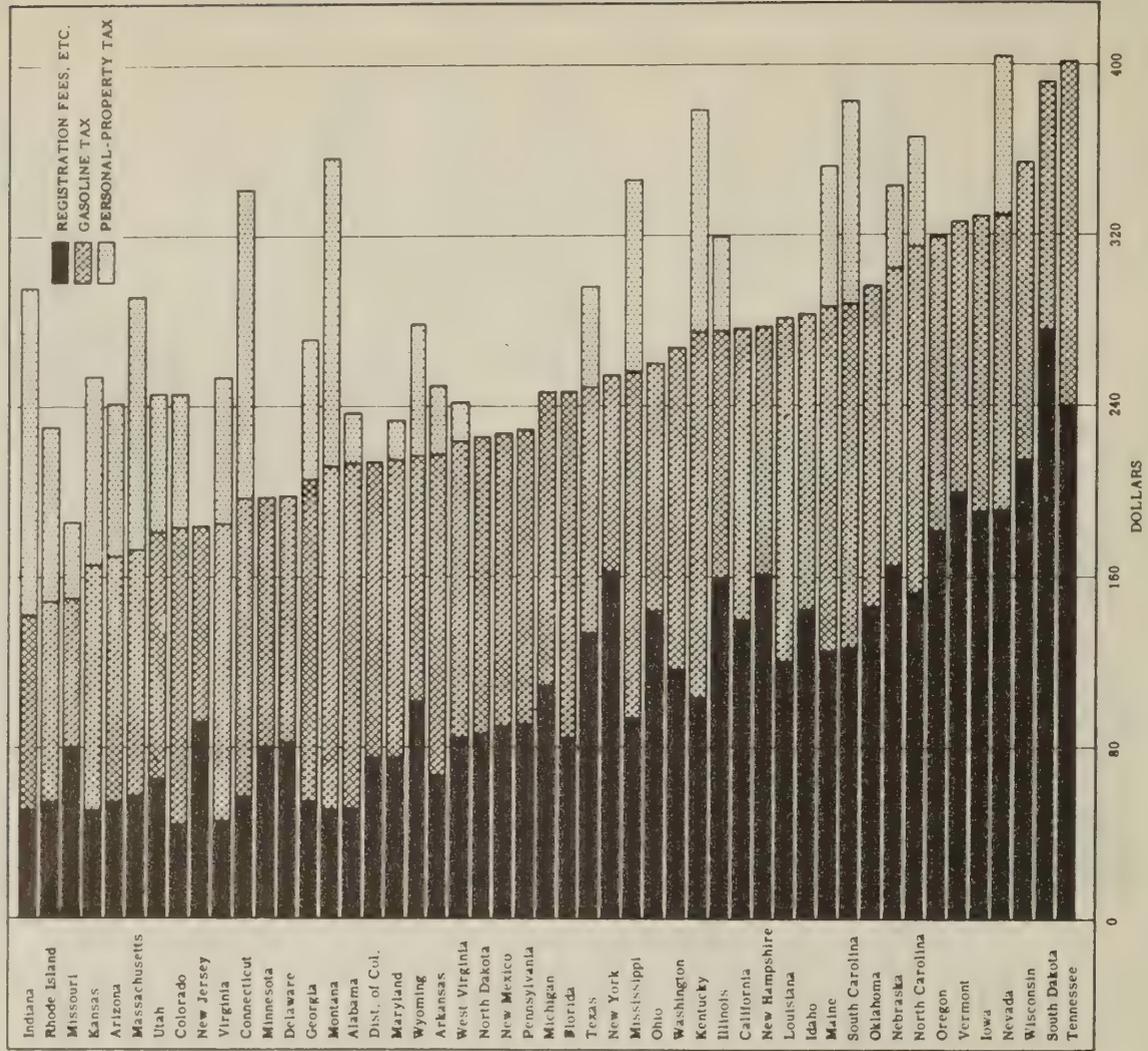


Figure 14.—State road-user and personal-property taxes on a 19,000-pound van truck (No. 5) in private use, ranked according to total taxes (left) and road-user taxes (right).

**Table 8.—Road-user and personal-property taxes on a single-unit, three-axle dump truck, 40,000 pounds gross vehicle weight (No. 6)**

State	Private operation							
	Registration fee	Property tax	Other taxes and fees	Mileage or ton-mile tax	Gasoline tax	Total	Rank of State	
							Total fees and taxes	Total, excluding property tax
<b>New England:</b>								
Maine.....	\$300.00	\$133.39	-----	-----	\$525.00	\$958.39	9	19
New Hampshire.....	240.00	-----	\$96.04	-----	375.00	711.04	38	29
Vermont.....	420.00	-----	-----	-----	412.50	832.50	23	18
Massachusetts.....	120.00	235.00	-----	-----	375.00	730.00	33	46
Rhode Island.....	127.00	167.40	-----	-----	300.00	594.40	45	47
Connecticut.....	200.00	218.88	-----	-----	450.00	868.88	19	36
<b>Middle Atlantic:</b>								
New York.....	200.00	-----	-----	\$187.50	300.00	687.50	40	32
New Jersey.....	240.00	-----	1.00	-----	300.00	541.00	47	43
Pennsylvania.....	300.00	-----	-----	-----	450.00	750.00	29	25
Delaware.....	178.50	-----	-----	-----	375.00	553.50	46	42
Maryland.....	360.00	50.00	-----	-----	450.00	860.00	20	20
District of Columbia.....	202.00	-----	1.00	-----	450.00	653.00	43	35
West Virginia.....	242.00	43.64	-----	-----	450.00	735.64	31	30
<b>Southeastern:</b>								
Virginia.....	180.00	82.17	-----	-----	450.00	712.17	37	37
North Carolina.....	320.00	112.19	-----	-----	525.00	957.19	11	16
South Carolina.....	401.00	224.71	-----	-----	525.00	1,150.71	3	7
Georgia.....	110.00	135.34	-----	-----	487.50	732.84	32	39
Florida.....	187.00	-----	.25	-----	525.00	712.25	36	28
Kentucky.....	350.00	214.92	.75	-----	525.00	1,090.67	5	13
Tennessee.....	435.00	-----	-----	-----	525.00	960.00	7	3
Alabama.....	100.00	25.46	.50	-----	525.00	650.96	44	38
Mississippi.....	271.00	92.15	-----	-----	525.00	888.15	17	21
<b>East Central:</b>								
Ohio.....	430.75	-----	2.00	150.00	375.00	957.75	10	4
Indiana.....	200.00	310.45	-----	-----	300.00	810.45	25	45
Illinois.....	640.00	86.92	-----	-----	375.00	1,101.92	4	2
Michigan.....	382.50	-----	-----	-----	450.00	832.50	22	17
Wisconsin.....	475.00	-----	-----	-----	450.00	925.00	14	9
Minnesota.....	350.00	-----	.25	-----	375.00	725.25	35	27
Iowa.....	465.00	-----	-----	-----	450.00	915.00	15	10
Missouri.....	100.00	58.38	-----	-----	225.00	383.38	48	48
<b>Southwestern:</b>								
Arkansas.....	200.00	40.18	-----	-----	487.50	727.68	34	31
Louisiana.....	240.00	-----	-----	-----	525.00	765.00	28	23
Oklahoma.....	395.50	-----	-----	-----	487.50	883.00	18	12
Texas.....	360.00	96.92	-----	-----	375.00	831.92	24	26
<b>West Central:</b>								
North Dakota.....	210.00	-----	121.50	-----	450.00	781.50	27	22
South Dakota.....	407.50	-----	465.00	-----	375.00	1,247.50	1	1
Nebraska.....	405.00	103.51	-----	-----	450.00	958.51	8	14
Kansas.....	150.00	128.18	-----	-----	375.00	653.18	42	44
<b>Mountain:</b>								
Montana.....	400.00	293.70	-----	-----	525.00	1,218.70	2	8
Idaho.....	100.00	-----	399.00	-----	450.00	949.00	12	5
Wyoming.....	130.00	128.05	257.50	-----	375.00	890.55	16	24
Colorado.....	211.88	128.05	1.00	-----	450.00	790.93	26	33
New Mexico.....	208.50	-----	-----	-----	450.00	658.50	41	34
Arizona.....	189.00	144.00	-----	-----	375.00	708.00	39	41
Utah.....	200.00	170.15	-----	-----	375.00	745.15	30	40
Nevada.....	85.00	149.35	375.30	-----	450.00	1,059.65	6	11
<b>Pacific:</b>								
Washington.....	-----	-----	-----	-----	-----	-----	-----	-----
Oregon.....	119.00	-----	360.00	-----	450.00	929.00	13	6
California.....	275.00	-----	122.00	-----	450.00	847.00	21	15

tion fees for this vehicle range from \$3 to \$40.19. The \$40.19 fee applies in Oklahoma, and this fee combined with the computed \$47.06 payment of gasoline tax (the Oklahoma gasoline-tax rate is 6½ cents per gallon) amounts to a total payment of \$87.25, the largest total of road-user taxes on this vehicle in any State. However, there is no property tax on motor vehicles in Oklahoma and if property taxes are included for States in which they are imposed, Oklahoma ranks seventeenth in total fees and taxes. Massachusetts, on the other hand, imposes a registration fee of only \$9, and with a 5-cent gasoline tax collects a total of \$45.20 in road-user taxes on the mediumweight sedan. If the property tax of \$56.50 is added, however, the total becomes \$101.70—substantially greater than the total of the Oklahoma taxes.

*Vehicle No. 3, pickup truck* (table 5; fig. 12).—The registration fees for the pickup truck in private use are slightly higher in most States than those on passenger cars. However, large numbers of pickup trucks are registered at reduced farm rates. The lowest registration fee for the pickup truck in any

State is \$3 (Louisiana), and this rate applies to farm service only. In six States the registration fee for the pickup in ordinary (non-farm) service is less than \$10. The highest registration fee for the pickup truck in private (non-farm) service is found in the District of Columbia, \$44.

It is probable that pickup trucks outnumber the total of all other trucks in many States. Although the total taxes on each pickup are relatively small compared with taxes on heavier vehicles, the large number of pickups makes this an extremely important category from a revenue standpoint.

*Vehicle No. 4, stake truck, 12,500 pounds gross vehicle weight* (table 6; fig. 13).—Vehicles in the 12,500-pound group are subject to registration fees which in some States break away rather sharply from the fees charged on automobiles and pickup trucks, although this is not true in all cases. The stake truck can be registered in Georgia and Wyoming for \$15, in Virginia for \$19.50, and in Missouri for \$20. At the other end of the registration-fee scale for this vehicle are Wisconsin and Vermont where the fees for the 12,500-pound stake

truck are \$140.00 and \$118.75, respectively. Here again the farm vehicle rates offer substantial fee reductions in many States, including Vermont and Wisconsin.

In contrast to the heavier trucks, there are large numbers of vehicles registered in the approximate weight range represented by this 12,500-pound unit (the group commonly classed as "1½-ton").

*Vehicle No. 5, van truck, 19,000 pounds gross vehicle weight* (table 7; fig. 14).—The average registration fee on the 19,000-pound van truck in private service is \$112.56. The lowest fee (\$44.44 including a \$1.00 inspection fee charge) is found in Colorado, and the highest is that of Tennessee, \$240. Other road-user taxes—those not included in the motor fuel or registration groups—become more in evidence on reaching the vehicles in the 19,000-pound weight group. In 10 States such additional fees amount to \$40 or more on this vehicle in private operation.

*Vehicle No. 6, 40,000-pound dump truck* (table 8; fig. 15).—The 40,000-pound dump truck, with perhaps minor adjustments of axle spacing, would be permitted to operate in all States except Washington. (Its axle spacing and loading are representative of concrete transit-mix and other special equipment.) The Nevada registration fee on this truck is \$85, and there are three States in which the registration fee is \$100. The highest fee, \$640, is found in Illinois, and the average for all States is \$266.94. The registration fees, however, while still important are of relatively reduced significance on vehicles of this gross weight. The mileage and other taxes must be combined with registration fees in order to get a significant comparison.

*Vehicle No. 7, 40,000-pound combination* (table 10; fig. 16).—The 40,000-pound combination is typical of the largest group of combinations, and is found in substantial numbers even where much heavier vehicles are permitted. It is legal in all States. The average road-user tax payment on it in private operation is \$794.74. The Colorado registration fee on this combination is nominal, \$22.50; but this low registration fee is accompanied by a substantial mileage tax. In Alabama and Georgia, the only two States that still retain the "manufacturer's rated capacity" basis of assessing registration fees, the registration fees are \$75 and \$135, respectively, and neither of the two States imposes a mileage tax. However, the gasoline-tax rate in Alabama is 7 cents per gallon and in Georgia, 6½ cents per gallon. It is interesting to note in table 9 (p. 57) that some States impose on the tractor by far the larger part of the total taxes on the combination, whereas in others the semitrailers carry a relatively large part of the total tax. Although the differences between the taxes on vehicle Number 7 in private operation and the same vehicle in contract service are not discussed in detail here, the variations between the types and the total amounts of taxes on the different services are very great in some States.

(Text continued on page 57)

# STATE LEGAL MAXIMUM LIMITS OF MOTOR VEHICLE SIZES AND WEIGHTS

Prepared by the Bureau of Public Roads, July 1956

Line	State	Width inches <sup>1</sup>	Height ft.-in.	Length—feet <sup>2</sup>				Number of towed units <sup>3</sup>				Axle load—pounds				Type of restriction	Formula or equation
				Single unit		Truck tractor semi-trailer	Other combination	Semi-trailer	Full trailer	Semi-trailer and full trailer	Single		Tandem				
				Truck	Bus						Statutory limit	Including statutory enforcement tolerance	Statutory limit	Including statutory enforcement tolerance			
1	Alabama	96	6 12-6	35	40	50	NP	I	NP	NP	18,000	19,800	35,000	39,600	Table		
2	Arizona	96	13-6	40	40	65	65	I	I	2	18,000		32,000		Table		
3	Arkansas	96	13-6	35	40	50	50	I	I	NP	18,000	7 18,500	32,000	32,500	Spec. maximum <sup>8</sup>		
4	California	96	13-6	35	9 35	10 60	60	NR	NR	NR	18,000		32,000		Table		
5	Colorado	11 96	12-6	35	40	60	60	I	2	2	18,000		36,000		Formula-spec. limits	800 (L)	
6	Connecticut	102	12-6	45	45	45	NP	I	NP	NP	22,400	22,843	36,000	36,720	Spec. lim.-tire cap.		
7	Delaware	96	6 12-6	35	42	50	60	I	I	2	20,000		36,000		Table-spec. limits <sup>53</sup>		
8	District of Columbia	96	12-6	35	35	50	50	I	I	NP	22,000		38,000		Table		
9	Florida	96	6 12-6	12 35	40	50	50	I	I	NP	20,000	22,000	40,000	44,000	Table		
10	Georgia	96	13-6	13 + 39	13 + 45	48	48	I	I	NP	18,000	20,340	36,000	40,680	Spec. maximum <sup>14</sup>		
11	Hawaii	96	13-0	40	40	55	65	I	I	2	24,000		30,800		Formula <sup>55</sup>	800 (L)	
12	Idaho	15 96	14-0	35	16 40	60	65	I	I	2	17 18,000		17 32,000		Table <sup>17</sup>		
13	Illinois	96	13-6	42	42	50	50	I	I	2	18 18,000		32,000		Spec. lim.-tire cap.		
14	Indiana	96	13-6	36	40	50	50	I	I	2	19 18,000	19 19,000	19 32,000	19 33,000	Spec. lim.-tire cap. <sup>19</sup>		
15	Iowa	96	6 12-6	35	16 40	20 45	NP	I	NP	NP	18,000	18,540	32,000	32,960	Table		
16	Kansas	96	12-6	35	16 40	50	50	I	I	NP	18,000		32,000		Table		
17	Kentucky	96	21 12-6	22 35	22 35	56 48	NP	I	NP	NP	18,000	57 18,900	32,000	57 33,600	Spec. lim.-tire cap. <sup>58</sup>		
18	Louisiana	96	6 12-6	35	16 40	50	60	I	I	NP	18,000		32,000		Axle lim.-tire cap.		
19	Maine	96	23 12-6	24 45	24 45	24 45	24 45	I	I	NP	22,000		32,000		Table-tire cap. <sup>25</sup>		
20	Maryland	96	6 12-6	55	55	55	55	NR	NR	NR	22,400		26 40,000		Formula	850 (L)	
21	Massachusetts	96	NR	35	16 40	45	NP	I	NP	NP	22,400		36,000		Table-spec. limits	1,000 (L)	
22	Michigan	96	6 12-6	35	40	55	55	I	I	2	28 18,000		29 32,000		Axle lim.-tire cap.		
23	Minnesota	96	6 12-6	40	40	45	45	I	I	NP	18,000		28,000		Table		
24	Mississippi	96	6 12-6	35	40	59 45	45	I	I	NP	18,000		28,550	30 32,000	Table-tire cap.		
25	Missouri	96	12-6	35	40	45	45	I	I	2	18,000		32,000		Table		
26	Montana	15 96	13-6	35	40	60	60	I	I	31 2	18,000		32,000		Table		
27	Nebraska	96	12-6	35	16 40	50	50	I	I	NP	18,000	18,900	32,000	33,600	Table		
28	Nevada	96	NR	NR	NR	NR	NR	NR	NR	NR	18,000	18,900	32,000	33,600	Table		
29	New Hampshire	96	13-6	35	16 40	45	45	NR	NR	NR	22,400		36,000		Tables-spec. limits		
30	New Jersey	96	13-6	35	33 35	45	34 50	I	I	NP	22,400	23,520	32,000	33,600	Spec. limits		
31	New Mexico	35 96	13-6	40	40	65	65	I	I	2	21,600		34,320		Table		
32	New York	96	13-0	35	36 35	50	50	I	I	NP	22,400		36,000		Formula	34,000 (L)	
33	North Carolina	96	6 12-6	35	16 40	48	48	I	I	NP	18,000	19,000	36,000	38,000	Spec. limits		
34	North Dakota	96	12-6	12 35	16 40	50	50	I	I	NP	18,000		30,000		Formula	550 & 750 (L)	
35	Ohio	96	6 12-6	35	16 40	50	60	I	NR	NR	19,000		31,500		Formula	800 (L)	
36	Oklahoma	96	13-6	35	45	50	50	I	I	NP	18,000		32,000		Table		
37	Oregon	96	38 12-6	35	30 40	30 55	30 60	I	I	30 2	39 18,000		39 32,000		Table <sup>40</sup>		
38	Pennsylvania	96	6 12-6	35	16 40	50	50	I	I	NP	22,400	23,072	36,000	37,080	Spec. limits <sup>41</sup>		
39	Puerto Rico <sup>54</sup>												NS		Spec. limits		
40	Rhode Island	102	12-6	40	40	50	50	I	I	NP	22,400						
41	South Carolina	96	12-6	12 35	16 40	50	50	I	I	NP	20,000		32,000		Table		
42	South Dakota	96	13-0	35	16 40	50	50	I	I	NP	18,000		32,000		Table		
43	Tennessee	96	12-6	35	40	45	45	I	I	NP	18,000		32,000		Table		
44	Texas	96	13-6	35	40	50	50	I	I	NP	18,000	18,900	32,000	33,600	Table		
45	Utah	96	14-0	45	45	60	60	NR	NR	NR	18,000		33,000		Table		
46	Vermont	96	12-6	50	50	50	50	I	I	NP	NS		NS		Spec. lim.-tire cap.		
47	Virginia	96	6 12-6	35	30 40	50	50	I	I	NP	18 18,000		60 32,000		Table		
48	Washington	96	5 12-6	35	16 40	60	60	I	I	47 2	18,000	48 18,500	32,000	48 33,000	Table-spec. lim. <sup>49</sup>		
49	West Virginia	96	6 12-6	35	16 40	45	45	I	I	NP	18,000	18,900	32,000	33,600	Table		
50	Wisconsin	96	6 12-6	35	40	50	50	I	I	NP	18,000	50 19,500	30,000	32,000	Table-formula <sup>51</sup>	1,000 (L)	
51	Wyoming	96	13-6	40	40	60	60	I	I	2	18,000		32,000	52 36,000	Table		
	AASHTO Policy	96	12-6	35	16 40	50	60	I	I	NP	18,000		32,000		Table	1,025 (L + 2)	
	Number of States																
	Higher	2	20	15	28	14	5	5	7	20	30		29		Formula	6	
	Same	48	30	35	18	22	10	45	38	30	20		16		Table	31	
	Lower	0	0	0	4	14	35	0	5	0	0		5		Specified limits	13	

NP—Not permitted.

NR—Not restricted.

NS—Not specified.

<sup>1</sup>Various exceptions for farm and construction equipment; public utility vehicles; urban, suburban, and school buses; haulage of agricultural and forest products; at wheels of vehicles; for safety accessories, and on designated highways.

<sup>2</sup>Various exceptions for utility vehicles and loads.

<sup>3</sup>When not specified, limited to number possible in practical combinations within permitted length limits.

<sup>4</sup>Legally specified or established by administrative regulation.

<sup>5</sup>Computed under the following conditions to permit comparison on a uniform basis between States with different types of regulation:

A. Front axle load of 8,000 pounds.

3. Maximum practical wheelbase within applicable length limits:

(1) Minimum front overhang of 3 feet.

(2) In the case of a 4-axle truck-tractor semitrailer, rear overhang computed as necessary to distribute the maximum possible uniform load on the maximum permitted length of semitrailer to the single drive-axle of the tractor and to the tandem axles of the semitrailer, within the permitted load limits of each.

(3) In the case of a combination having 5 or more axles, minimum possible combined front and rear overhang assumed to be 5 feet, with maximum practical load on maximum permitted length of semitrailer, subject to control of loading on axle groups and on total wheelbase as applicable.

C. Including statutory enforcement tolerances as applicable.

<sup>6</sup>Auto transports 13 feet 6 inches.

<sup>7</sup>Does not apply to combinations of adjacent load-carrying single axles.

<sup>8</sup>55,000 pounds on load-carrying axles, exclusive of steering-axle load.

<sup>9</sup>On specific routes in urban or suburban service under special permit from P.U.C. 40 feet.

<sup>10</sup>Limited by 40-foot maximum length of semitrailer to 55-foot practical maximum length in combination.

<sup>11</sup>Buses 102 inches

<sup>12</sup>Three-axle vehicles 40 feet.

<sup>13</sup>Truck 39 feet 5 1/2 inches; Bus 45 feet 2.4 inches

<sup>14</sup>63,280 pounds maximum, except on roads under Rural Roads Authority 56,000 pounds maximum.

<sup>15</sup>Buses 102 inches on highways of surfaced width at least 20 feet or otherwise as administratively authorized.

<sup>16</sup>Less than three axles 35 feet.

<sup>17</sup>Special limits for vehicles hauling timber and timber products, ores, construction materials, and agricultural products including livestock: single axle 18,900 pounds, tandem axle 36,000 pounds, vehicle with 3 or 4 axles permitted 56,000 pounds maximum at 21-foot axle spacing, 79,000 pounds maximum at 43-foot axle spacing.

<sup>18</sup>On designated highways; 16,000 pounds on other highways.

<sup>19</sup>On designated highways, single axle 22,400 pounds, tandem axle 36,000 pounds, total of all excesses of weight under one or more limitations of axle load a maximum of 79,000 pounds.

<sup>20</sup>Auto transports with load permitted overall length of 47 feet under annual permit.

<sup>21</sup>On designated highways; 11 feet 6 inches on other highways.

<sup>22</sup>On designated highways; trucks 26.5 feet and buses 30 feet on other highways.

<sup>23</sup>Including load 14 feet.

<sup>24</sup>Including load 46 feet 6 inches.

<sup>25</sup>Trucks hauling forest products, brakes on 3 axles at 18-foot minimum spacing; construction materials, brakes on 3 axles at 16-foot minimum spacing 48,000 pounds.

<sup>26</sup>Spaced less than 48 inches 36,000 pounds.

<sup>27</sup>Subject to axle and tabular limits.

<sup>28</sup>Single axle spaced less than 9 feet from nearest axle limited to 13,000 pounds.

<sup>29</sup>On designated highways only and limited to one tandem axle in combination.

<sup>30</sup>On designated highways only.

<sup>31</sup>Semitrailer and semitrailer converted to full trailer by means of a dolly.

<sup>32</sup>Dual-drive axles; otherwise 40,000 pounds.

<sup>33</sup>Or as prescribed by P.U.C.

<sup>34</sup>Exception for poles, pilings, structural units, etc., permitted 70 feet.

<sup>35</sup>On designated highways 102 inches.

<sup>36</sup>Trackless trolleys and 3-axle buses 40 feet.

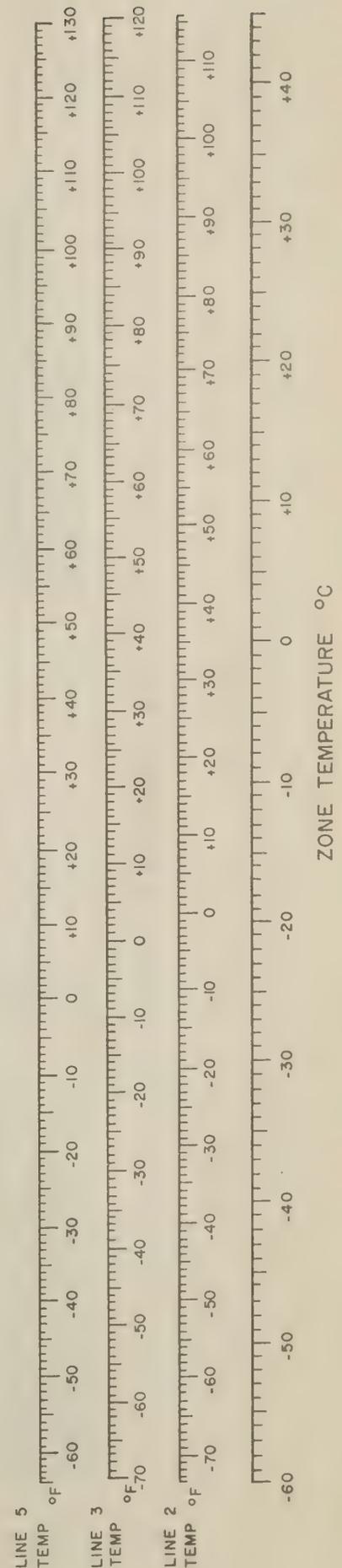
<sup>37</sup>Spaced less than 4 feet 24,000 pounds.

<sup>38</sup>Certain types of vehicles and commodities under special permit on designated highways.

COMPARED WITH AASHO STANDARDS

Applicable to:		Specified maximum gross weight—pounds <sup>4</sup>						Practical maximum gross weight—pounds <sup>5</sup>						Line
		Truck		Truck-tractor semitrailer				Truck		Truck-tractor semitrailer				
Wheelbase	Total wheel base only	2-axle	3-axle	3-axle	4-axle	5-axle	Other combination	2-axle	3-axle	3-axle	4-axle	5-axle	Other combination	
Over 18'	X							27,800	47,600	47,600	60,010	64,650	NP	1
Over 18'	X							26,000	40,000	44,000	58,000	72,000	76,800	2
Over 18'	X							26,500	40,500	45,000	59,000	65,000	65,000	3
Over 18'	X							26,000	40,000	44,000	58,000	72,000	76,000	4
	X	30,000	46,000					25,000	44,000	44,000	62,000	75,000	76,000	5
	X	32,000	50,000	50,000	60,000	60,000	NP	30,948	44,720	51,000	61,200	61,200	NP	6
	X	30,000	40,000	48,000	60,000	60,000	60,000	28,000	40,000	48,000	56,350	60,000	60,000	7
	X							30,000	46,000	52,000	58,450	61,490	64,650	8
Over 18'	X							30,000	52,000	52,000	65,200	71,115	71,115	9
Over 18'	X						63,280	28,340	48,680	48,680	63,280	63,280	63,280	10
	X							32,000	38,800	56,000	62,800	69,600	78,000	11
	X							26,000	40,000	44,000	58,000	72,000	76,800	12
	X	36,000	41,000	45,000	59,000	68,000	72,000	26,000	40,000	44,000	58,000	68,000	72,000	13
	X						72,000	27,000	41,000	45,000	59,000	73,000	73,000	14
	X							26,540	40,960	45,080	59,500	58,657	NP	15
	X							26,000	40,000	44,000	55,470	63,890	63,890	16
	X	36,000	50,000	54,000	59,640	59,640	NP	26,900	41,600	45,800	59,640	59,640	NP	17
	X	32,000	50,000	50,000	50,000	50,000	50,000	26,000	40,000	44,000	58,000	72,000	76,000	18
	X						65,000	30,000	40,000	50,000	50,000	50,000	50,000	19
	X						65,000	30,400	48,000	52,800	65,000	65,000	65,000	20
	X	<sup>27</sup> 46,000	<sup>27</sup> 60,000	<sup>27</sup> 60,000	<sup>27</sup> 60,000	<sup>27</sup> 60,000	NP	30,400	44,000	52,800	60,000	60,000	NP	21
	X							25,000	<sup>30</sup> 40,000	44,000	<sup>30</sup> 58,000	<sup>30</sup> 66,000	<sup>30</sup> 102,000	22
	X							26,000	36,000	44,000	54,000	65,500	65,500	23
	X							26,000	36,650	44,000	<sup>30</sup> 54,650	<sup>30</sup> 55,980	<sup>30</sup> 55,980	24
Over 18'	X							26,000	40,000	44,000	55,470	60,010	60,010	25
Over 22'	X							26,000	40,000	44,000	58,000	72,000	76,000	26
Over 18'	X							26,780	41,200	45,320	57,134	66,590	66,590	27
Over 18'	X							26,900	41,600	45,800	60,000	74,000	76,800	28
Over 18'	X	33,400	<sup>32</sup> 47,500	52,800	66,400	60,000	60,000	30,400	44,000	52,800	66,400	66,400	66,400	29
Over 18'	X	30,000	40,000	60,000	60,000	60,000	60,000	31,500	41,600	55,040	63,000	63,000	63,000	30
	X							29,600	42,320	51,200	63,920	76,640	86,400	31
	X							30,400	44,000	52,800	65,000	65,000	65,000	32
Over 18'	X	31,500	46,200	46,200	58,800	58,800	58,800	27,000	46,000	46,000	58,800	58,800	58,800	33
Over 18'	X							26,000	38,000	44,000	56,000	63,750	63,750	34
	X							27,000	39,500	46,000	58,500	71,000	78,000	35
	X							26,000	40,000	44,000	55,470	60,000	60,000	36
Over 18'	X	33,000	47,000	50,000	60,000	60,000	76,000	26,000	40,000	44,000	58,000	72,000	76,000	37
	X						62,000	31,072	45,080	51,500	61,800	61,800	63,860	38
	X	<sup>42</sup> 36,000	<sup>43</sup> 44,000	<sup>44</sup> 50,000	<sup>45</sup> 60,000	60,000	88,000	30,400	44,000	50,000	60,000	60,000	88,000	39
	X							28,000	40,000	48,000	60,000	65,839	71,115	41
	X							26,000	40,000	44,000	55,470	61,490	64,650	42
	X							26,000	40,000	44,000	55,980	55,980	43,500	43
	X							26,900	41,600	45,800	57,844	61,340	61,340	44
	X	30,000	40,000	50,000	<sup>46</sup> 60,000	<sup>46</sup> 60,000	<sup>46</sup> 60,000	26,000	41,000	44,000	59,000	74,000	79,900	45
Over 18'	X	28,000	36,000	46,000	60,000	68,000	72,000	30,000	40,000	50,000	60,000	60,000	60,000	46
	X							26,000	40,000	44,000	56,800	56,800	56,800	47
	X							26,000	36,000	44,000	60,000	68,000	72,000	48
	X							26,900	41,600	45,800	57,844	63,840	63,840	49
	X							27,500	40,000	47,000	59,500	68,000	68,000	50
	X							26,000	44,000	44,000	62,000	73,000	73,000	51
18	19							29	25	29	43	34	18	
								21	19	21	4	2	0	
								0	6	0	3	14	32	

<sup>39</sup> Logging vehicles permitted 3-foot wheelbase tolerance, 19,000-pound single axle, 34,000-pound tandem axle.  
<sup>40</sup> Governs gross weight permitted on highways designated by resolution of State highway commission.  
<sup>41</sup> Single unit truck with 4 axles permitted 60,000 pounds.  
<sup>42</sup> Axles spaced less than 6 feet 32,000 pounds; less than 12 feet 36,000 pounds; 12 feet or more gross weight governed by axle limit.  
<sup>43</sup> Single vehicle with 3 or more axles spaced less than 16 feet 40,000 pounds; less than 20 feet 44,000 pounds; 20 feet or more governed by axle limit.  
<sup>44</sup> Tractor semitrailer with 3 or more axles spaced less than 22 feet 46,000 pounds; not less than 27 feet 50,000 pounds.  
<sup>45</sup> Axles spaced 27 feet or more.  
<sup>46</sup> Tandem axles on trailer equipped with adequate brakes.  
<sup>47</sup> Under State highway commission rules.  
<sup>48</sup> Within discretion of enforcement officer.  
<sup>49</sup> Vehicles hauling logs permitted wheelbase and gross weight tolerances. Discretionary enforcement tolerances not included in computation of practical maximum gross weights.  
<sup>50</sup> Axle load 21,000 pounds on 2-axle trucks hauling unmanufactured forest products.  
<sup>51</sup> On Class A highways.  
<sup>52</sup> Based on ruling of Attorney General.  
<sup>53</sup> Legal limit 60,000 pounds.  
<sup>54</sup> Withheld pending approval of new statutes.  
<sup>55</sup> 700 (L+40) under 18'-800(L+40) 18 feet and over 900(L+40) on highways having no structure with span of 20 feet or over.  
<sup>56</sup> Class AA highways; 45 feet on other highways.  
<sup>57</sup> Class AA highways only.  
<sup>58</sup> Maximum gross weight on Class A highways 42,000 pounds; on Class B highways 30,000 pounds.  
<sup>59</sup> Auto transports permitted 50 feet  
<sup>60</sup> Vehicles registered before July 1, 1956 permitted limits in effect January 1, 1956 for life of vehicle.



ZONE TEMPERATURE °C

40,000-POUND TANDEM-AXLE DUMP TRUCK (No. 6)

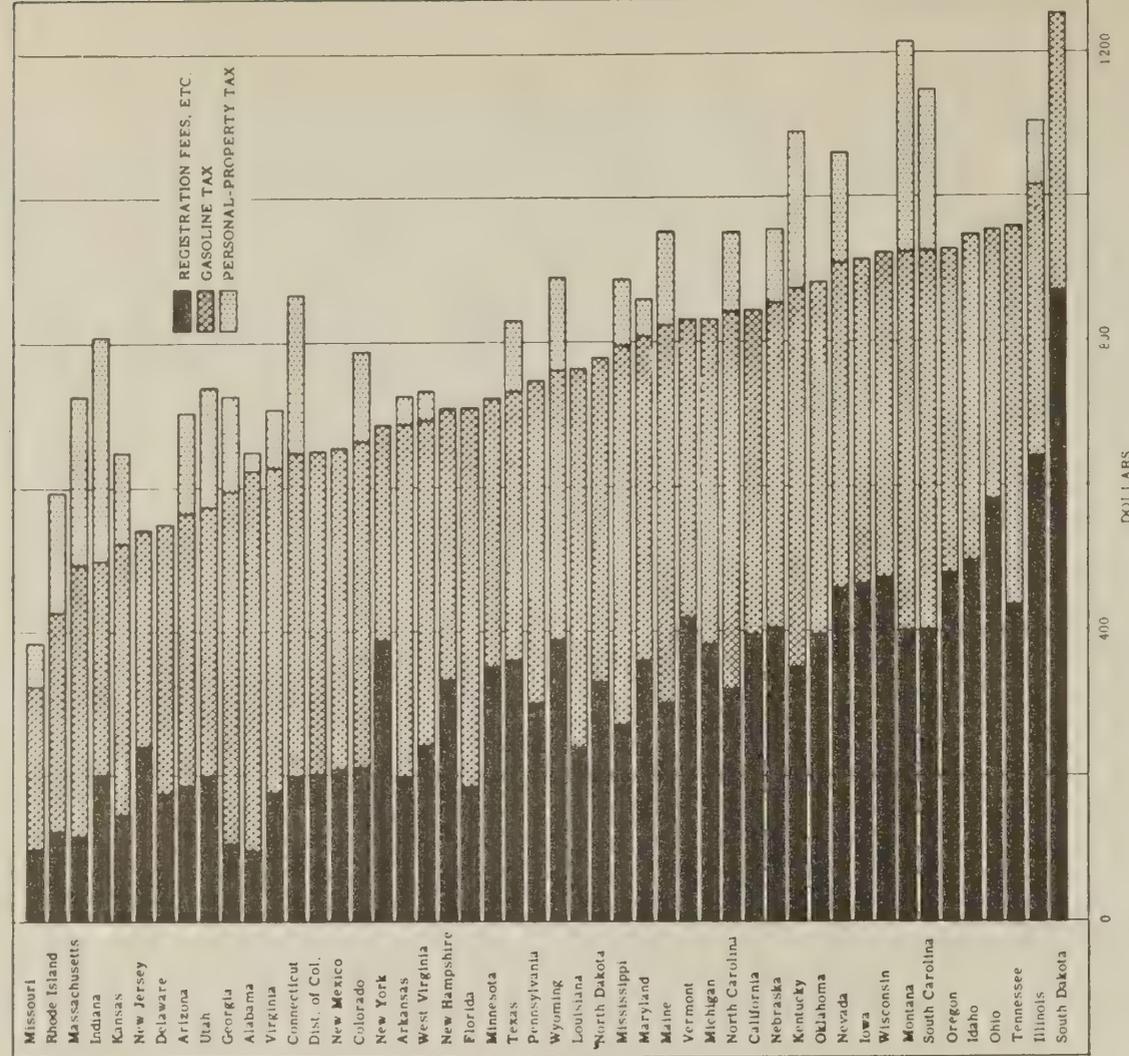
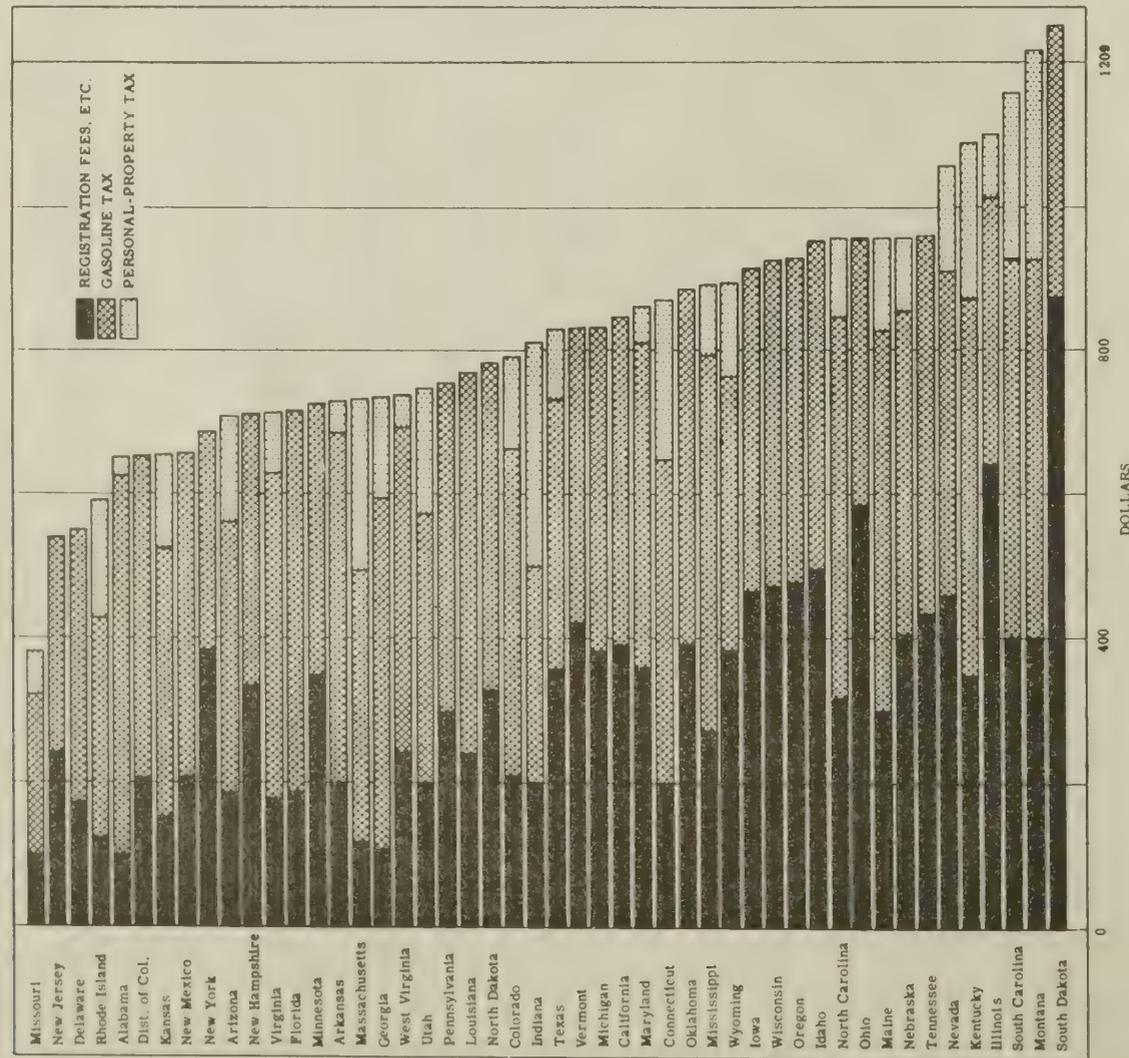


Figure 15.—State road-user and personal-property taxes on a 40,000-pound tandem-axle dump truck (No. 6) in private use, ranked according to total taxes (left) and road-user taxes (right).

Table 9.—Road-user and personal-property taxes on the tractor and the semitrailer of a three-axle combination, 40,000 pounds gross vehicle weight (No. 7), in private operation

State	Tractor truck						Semitrailer				
	Registra- tion fee	Property tax	Other taxes and fees	Mileage or ton- mile tax	Gasoline tax	Total	Registra- tion fee	Property tax	Other taxes and fees	Mileage or ton- mile tax	Total
New England:											
Maine.....	\$300.00	\$70.39			\$560.00	\$930.39	\$5.00	\$117.00			\$122.00
New Hampshire.....	240.00		\$50.68		400.00	690.68			\$46.80		46.80
Vermont.....	420.00				440.00	860.00	15.00				15.00
Massachusetts.....	120.00	125.00			400.00	645.00	2.00	116.00			118.00
Rhode Island.....	127.00	87.27			320.00	594.27	2.00	80.60			82.60
Connecticut.....	200.00	115.52			480.00	795.52		123.88			123.88
Middle Atlantic:											
New York.....	79.00			\$400.00	320.00	799.00	162.50				162.50
New Jersey.....	110.00		1.00		320.00	431.00	90.00		1.00		91.00
Pennsylvania.....	190.00				480.00	670.00	125.00				125.00
Delaware.....	95.70				400.00	495.70	77.30				77.30
Maryland.....	35.00	30.00			480.00	545.00	100.00	15.00			115.00
District of Columbia.....	74.00		1.00		480.00	555.00	74.00		1.00		75.00
West Virginia.....	227.00	18.91			480.00	725.91	15.00	26.18			41.18
Southeastern:											
Virginia.....	30.00	74.33			480.00	584.33	150.00	68.64			218.64
North Carolina.....	176.00	57.55			560.00	793.55	144.00	96.60			240.60
South Carolina.....	191.00	128.71			560.00	789.71	96.00	109.72			205.72
Georgia.....	25.00	73.41			520.00	618.41	110.00	65.98			175.98
Florida.....	86.90		.25		560.00	647.15	109.50		.25		109.75
Kentucky.....	350.00	111.44	.75		560.00	1,022.19		103.48			103.48
Tennessee.....	435.00				560.00	995.00					
Alabama.....	50.00	135.16	.50		560.00	745.66	25.00	124.80	.50		150.30
Mississippi.....	271.00	81.41			560.00	912.41	11.00	75.74			86.74
East Central:											
Ohio.....	152.25		2.00	400.00	400.00	954.25	132.65				132.65
Indiana.....	215.00	85.20			320.00	620.20		78.63			78.63
Illinois.....	640.00	41.45			400.00	1,081.45		21.81			21.81
Michigan.....	154.95				480.00	634.95	142.35				142.35
Wisconsin.....	475.00				480.00	955.00	10.00				10.00
Minnesota.....	350.00		.25		400.00	750.25	10.00		.25		10.25
Iowa.....	435.00				480.00	915.00	60.00				60.00
Missouri.....	300.00	35.02			240.00	575.02	7.00	37.36			44.36
Southwestern:											
Arkansas.....	200.00	34.56			520.00	754.56	5.00	29.40			34.40
Louisiana.....	140.00				560.00	700.00	120.00				120.00
Oklahoma.....	50.50				520.00	570.50	295.50				295.50
Texas.....	154.00	47.95			400.00	601.95	117.00	42.05			159.05
West Central:											
North Dakota.....	420.00		135.00		480.00	1,035.00					
South Dakota.....	102.50		215.00		400.00	717.50	81.00		185.00		266.00
Nebraska.....	440.00	45.81			480.00	965.81	1.00	78.33			79.33
Kansas.....	300.00	93.85	10.00		400.00	803.85	20.00	82.20			102.20
Mountain:											
Montana.....	60.00	154.97			560.00	774.97	40.00	143.13			183.13
Idaho.....	100.00			532.00	480.00	1,112.00	2.00				2.00
Wyoming.....	40.00	67.57	2.50	158.30	400.00	668.37	40.00	62.40	2.50	\$182.50	287.40
Colorado.....	17.50	67.57	1.00		480.00	566.07	5.00	62.40		837.44	904.84
New Mexico.....	103.50				480.00	583.50	73.00				73.00
Arizona.....	55.35	76.20			400.00	531.55	51.45	70.40			121.85
Utah.....	200.00	67.77			400.00	667.77	5.00	82.92			87.92
Nevada.....	39.50	126.75	155.00		480.00	801.25	36.50	117.00	144.80		298.30
Pacific:											
Washington.....	105.00		39.20		520.00	664.20	55.00		44.00		99.00
Oregon.....	56.00			760.00	480.00	1,296.00	51.10				51.10
California.....	75.00		67.00		480.00	622.00	108.00		60.00		168.00

Vehicle No. 8, 50,000-pound gasoline-powered combination (table 11; fig. 17).—The 50,000-pound combination is now legal in all States except Kentucky, and can be operated in Kentucky with reduced load. The average registration fee for this combination is \$316.44 when in private service, but in contract service the average registration fee is \$342.61. The highest annual total of road-user taxes in private service is \$2,772.88, and in contract service the highest total of road-user taxes is \$2,793.83.

Figure 21 (p. 66) compares, for this combination and for the 40,000-pound combination, the tax costs in cents-per-mile of private and contract operation.

Vehicle No. 9, 50,000-pound diesel-powered combination (table 12; fig. 18).—The 50,000-pound diesel-powered combination, empty, is

somewhat heavier than the 50,000-pound gasoline combination and thus carries a correspondingly smaller payload when operating at full capacity. (It is also a somewhat more expensive combination than the one with gasoline power and is subject to greater property taxes in many States.) Offset against this, however, is its substantial saving in total fuel cost, including tax. (The diesel combination is assumed to save one-third in fuel gallonage.) The saving in fuel is highly desirable from almost any standpoint, but the resulting reductions in fuel-tax contributions for the support of highways poses a problem. Seven States have already imposed higher rates on diesel fuel in an effort to obtain a tax contribution similar to that of gasoline-powered vehicles. Vermont does not tax diesel fuel but does impose an equalization fee.

The relation between taxes paid on a gasoline-powered combination of 50,000 pounds gross weight and a similar diesel-powered combination may be developed by comparison of data in tables 11 and 12.

A comparison of the tax costs in cents per mile for private use and contract operation is given in figure 22 (p. 67) for this combination (vehicle No. 9), and also for vehicle Nos. 10 and 11, the heaviest diesel-powered combinations.

This study was made in late 1955 and early 1956, and does not take into consideration State legislation of the 1956 sessions. Size and weight limitations reported on page 38 do not agree in every instance with the table on pages 54-55, which shows State legal maximum limits of motor-vehicle sizes and weights as of July 1, 1956.

(Tables 10-13 and figures 16-22 follow)

Table 10.—Road-user and personal-property taxes on a three-axle tractor-semitrailer combination, 40,000 pounds gross vehicle weight (No. 7)

State	Private operation							Contract carrier										
	Regis- tration fee	Property tax	Other taxes and fees	Mileage or ton-mile tax	Gasoline tax	Total	Rank of State		Regis- tration fee	Property tax	Other taxes and fees	Carrier taxes and fees	Mileage or ton-mile tax	Gasoline tax	Total	Rank of State		
							Total fees and taxes	Total, excluding property tax								Total fees and taxes	Total, excluding property tax	
New England:																		
Maine.....	\$305.00	\$187.39	\$97.48	---	\$560.00	\$1,052.39	8	17	\$305.00	\$187.39	\$97.48	\$30.00	---	\$560.00	\$1,082.39	19	24	
New Hampshire.....	240.00	---	---	---	400.00	737.48	40	29	240.00	---	---	2.00	---	400.00	739.48	41	35	
New Jersey.....	435.00	---	---	---	400.00	875.00	24	15	435.00	---	---	---	---	400.00	875.00	31	25	
Massachusetts.....	122.00	241.00	---	---	320.00	763.00	35	46	122.00	241.00	---	15.00	---	400.00	778.00	37	47	
Rhode Island.....	129.00	167.87	---	---	480.00	616.87	47	49	129.00	167.87	---	5.00	---	320.00	621.87	47	49	
Connecticut.....	200.00	239.40	---	---	480.00	919.40	21	33	200.00	239.40	---	5.00	---	480.00	924.40	28	38	
Middle Atlantic:																		
New York.....	241.50	---	---	---	320.00	961.50	18	11	241.50	---	---	---	---	320.00	961.50	25	20	
New Jersey.....	200.00	---	2.00	---	320.00	522.00	49	47	200.00	---	2.00	---	---	320.00	522.00	49	48	
Pennsylvania.....	315.00	---	---	---	480.00	795.00	28	22	315.00	---	---	---	---	480.00	795.00	35	31	
Delaware.....	173.00	---	---	---	400.00	573.00	48	43	173.00	---	---	---	---	400.00	573.00	48	44	
Maryland.....	135.00	45.00	---	---	480.00	660.00	42	41	135.00	45.00	---	---	---	480.00	660.00	43	42	
District of Columbia.....	148.00	---	2.00	---	480.00	630.00	45	40	148.00	---	2.00	---	---	480.00	630.00	46	41	
West Virginia.....	242.00	45.09	---	---	480.00	767.09	33	32	242.00	45.09	---	39.50	---	480.00	806.59	33	34	
Southeastern:																		
Virginia.....	180.00	142.97	---	---	480.00	802.97	27	36	180.00	142.97	---	480.00	---	480.00	802.97	5	4	
North Carolina.....	320.00	154.15	---	---	560.00	1,034.15	11	14	320.00	154.15	---	---	---	560.00	1,274.15	7	7	
South Carolina.....	197.00	238.43	---	---	520.00	995.43	13	27	197.00	238.43	---	350.00	---	560.00	1,345.43	4	4	
Georgia.....	135.00	139.39	---	---	520.00	794.39	29	38	135.00	139.39	---	25.00	---	520.00	946.89	27	29	
Florida.....	196.40	---	.50	---	560.00	756.90	38	28	196.40	---	.50	50	200.00	560.00	983.90	21	16	
Kentucky.....	350.00	214.92	.75	---	560.00	1,125.67	3	13	350.00	214.92	.75	325.00	---	560.00	1,250.42	9	15	
Tennessee.....	435.00	---	---	---	560.00	995.00	14	7	435.00	---	---	17.50	---	560.00	1,137.50	11	5	
Alabama.....	75.00	259.96	1.00	---	560.00	895.96	23	39	75.00	259.96	1.00	---	---	560.00	1,195.96	10	22	
Mississippi.....	282.00	157.15	---	---	560.00	999.15	12	19	282.00	157.15	---	13.00	---	560.00	1,282.15	6	6	
East Central:																		
Ohio.....	284.90	---	2.00	400.00	400.00	1,086.90	7	4	284.90	---	2.00	30.00	400.00	400.00	1,116.90	12	8	
Indiana.....	215.00	163.83	---	---	320.00	698.83	41	45	215.00	163.83	---	24.00	---	320.00	722.83	42	46	
Illinois.....	640.00	63.26	---	---	400.00	1,103.26	5	5	640.00	63.26	---	---	---	400.00	1,103.26	14	14	
Michigan.....	296.40	---	---	---	480.00	776.40	32	24	296.40	---	---	---	120.00	480.00	896.40	30	23	
Wisconsin.....	485.00	---	---	---	480.00	965.00	17	10	485.00	---	---	20.00	---	480.00	985.00	23	18	
Minnesota.....	300.00	---	.50	---	400.00	700.50	37	26	300.00	---	.50	7.50	---	400.00	788.00	39	33	
Iowa.....	495.00	---	---	---	480.00	975.00	16	9	495.00	---	---	5.00	---	480.00	980.00	24	19	
Missouri.....	307.00	72.38	---	---	240.00	619.38	46	44	307.00	72.38	---	25.00	---	240.00	644.38	45	45	
Southwestern:																		
Arkansas.....	205.00	63.96	---	---	520.00	788.96	31	31	205.00	63.96	---	---	---	520.00	788.96	36	37	
Louisiana.....	290.00	---	---	---	520.00	820.00	26	21	290.00	---	---	10.00	---	560.00	1,090.00	16	12	
Oklahoma.....	346.00	---	---	---	520.00	866.00	25	16	346.00	---	---	4.50	---	520.00	870.50	32	26	
Texas.....	271.00	90.00	---	---	400.00	761.00	36	34	271.00	90.00	---	11.00	---	400.00	772.00	38	39	
West Central:																		
North Dakota.....	420.00	---	135.00	---	480.00	1,035.00	10	6	420.00	---	135.00	55.00	---	480.00	1,090.00	17	13	
South Dakota.....	183.50	---	400.00	---	400.00	983.50	15	8	183.50	---	400.00	10.00	---	400.00	993.50	22	17	
Nebraska.....	441.00	124.14	---	---	480.00	1,045.14	9	12	441.00	124.14	---	30.00	---	480.00	1,075.14	20	21	
Kansas.....	320.00	176.05	10.00	---	400.00	906.05	22	30	320.00	176.05	10.00	---	---	400.00	906.05	29	36	
Mountain:																		
Montana.....	100.00	298.10	---	---	560.00	958.10	19	35	100.00	298.10	---	130.00	---	560.00	1,088.10	18	32	
Idaho.....	102.00	---	---	532.00	480.00	1,114.00	4	3	102.00	---	---	---	532.00	480.00	1,114.00	13	9	
Wyoming.....	80.00	129.97	5.00	---	400.00	695.77	20	20	80.00	129.97	5.00	---	340.80	400.00	955.77	26	28	
Colorado.....	22.50	129.97	1.00	837.44	480.00	1,470.91	1	2	22.50	129.97	1.00	---	837.44	480.00	1,470.91	2	3	
New Mexico.....	176.50	---	---	---	480.00	656.50	43	37	176.50	---	---	---	---	480.00	656.50	44	44	
Arizona.....	106.80	146.60	---	---	400.00	653.40	44	48	106.80	146.60	---	600.00	---	400.00	1,253.40	8	11	
Utah.....	205.00	150.69	---	---	400.00	755.69	39	42	205.00	150.69	---	299.80	---	400.00	755.69	40	43	
Nevada.....	76.00	243.75	299.80	---	480.00	1,099.55	6	18	76.00	243.75	299.80	---	---	480.00	1,099.55	15	27	
Pacific:																		
Washington.....	160.00	---	83.20	---	520.00	763.20	34	25	160.00	---	83.20	36.00	---	520.00	799.20	34	30	
Oregon.....	107.10	---	---	760.00	480.00	1,347.10	2	1	107.10	---	---	---	760.00	480.00	1,347.10	3	2	
California.....	183.00	---	127.00	---	480.00	790.00	30	23	183.00	---	127.00	---	---	480.00	790.00	31	1	

40,000-POUND THREE-AXLE TRACTOR-SEMITRAILER (No. 7)

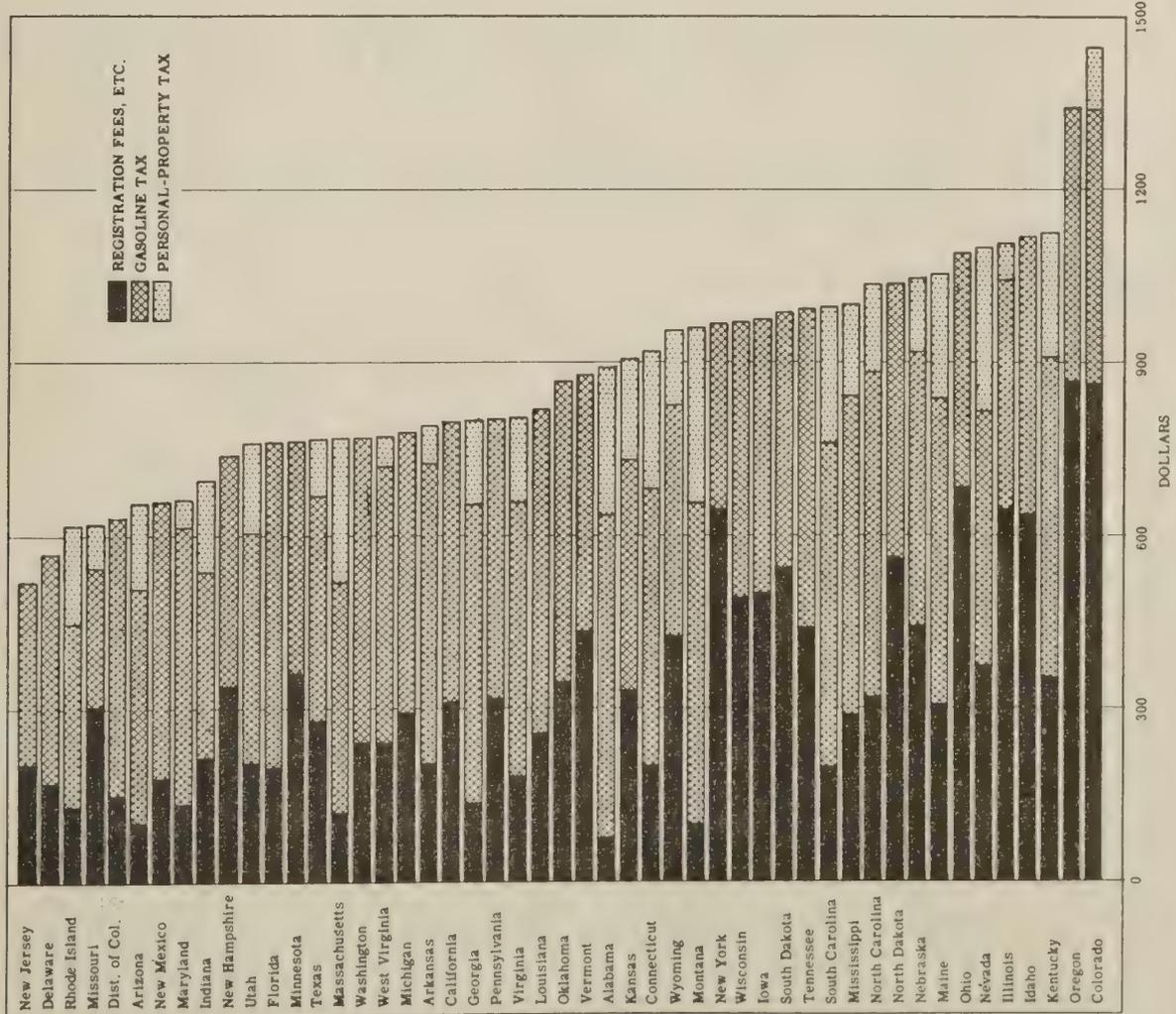
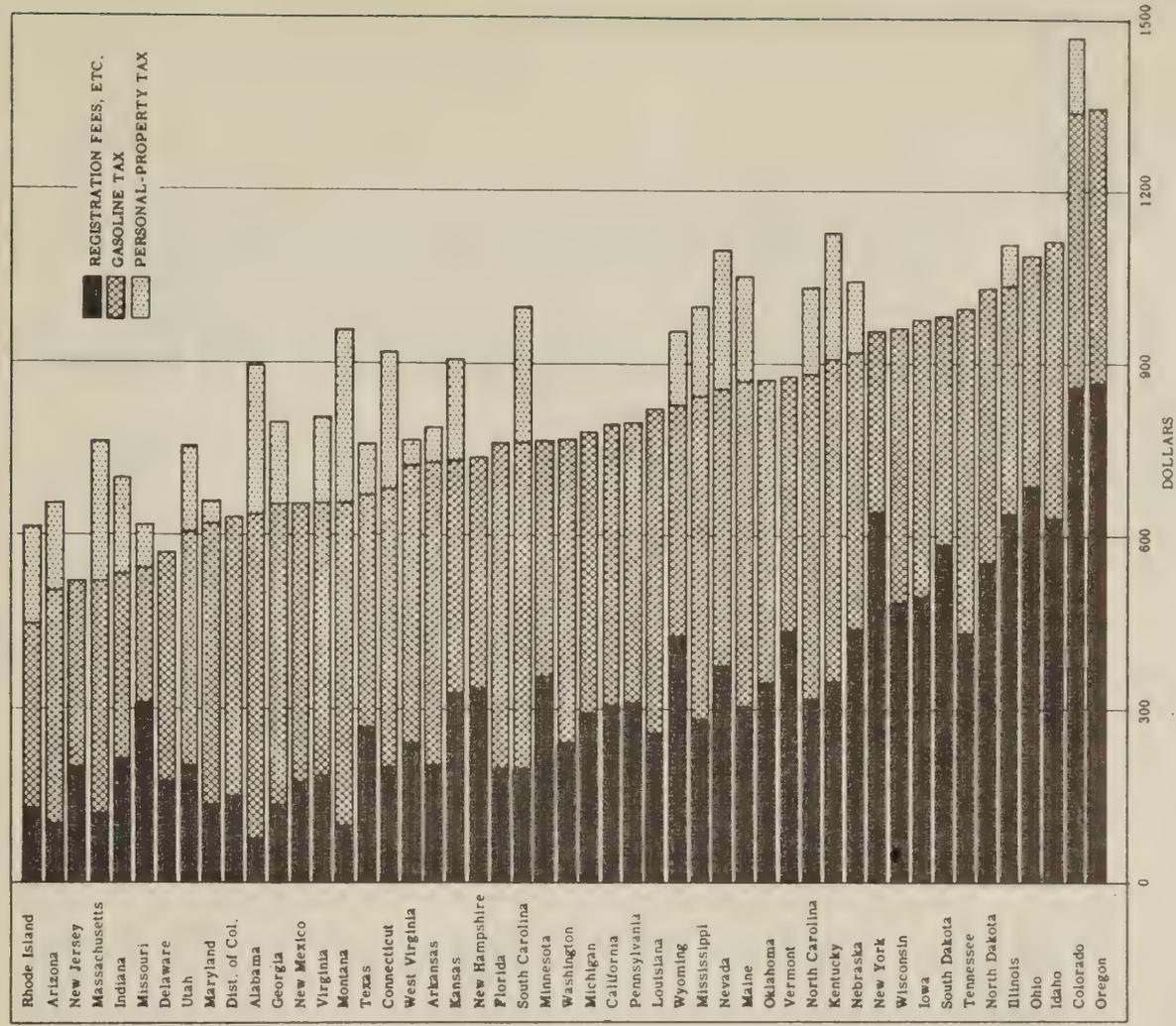


Figure 16.—State road-user and personal-property taxes on a 40,000-pound three-axle tractor-semitrailer combination (No. 7) in private use, ranked according to total taxes (left) and road-user taxes (right).

Table 11.—Road-user and personal-property taxes on a gasoline-powered, four-axle, tractor-semitrailer combination, 50,000 pounds gross vehicle weight (No. 8)

State	Private operation							Contract carrier									
	Regis- tration fee	Property tax	Other taxes and fees	Mileage or ton-mile tax	Gasoline tax	Total	Rank of State		Regis- tration fee	Property tax	Other taxes and fees	Carrier taxes and fees	Mileage or ton-mile tax	Gasoline tax	Total	Rank of State	
							Total fees and taxes	Total, excluding property tax								Total fees and taxes	Total, excluding property tax
New England:																	
Maine.....	\$355.00	\$219.54	\$116.42		\$1,050.00	\$1,624.54	10	17	\$355.00	\$219.54		\$30.00		\$1,050.00	\$1,654.54	18	25
New Hampshire.....	300.00				750.00	1,166.42	39	33	300.00		2.00			750.00	1,168.42	40	36
Vermont.....	590.00	286.00			825.00	1,415.00	23	16	590.00	286.00				825.00	1,415.00	30	27
Massachusetts.....	152.00	200.51			750.00	1,188.00	38	44	152.00	200.51	15.00			750.00	1,203.00	38	45
Rhode Island.....	155.00	240.92			600.00	955.51	47	48	155.00	240.92	5.00			600.00	960.51	47	48
Connecticut.....	250.00				900.00	1,390.92	26	34	250.00		5.00			900.00	1,395.92	32	37
Middle Atlantic:																	
New York.....	298.50			\$816.00	600.00	1,714.50	6	6	298.50			\$816.00		600.00	1,714.50	15	14
New Jersey.....	280.00		2.00		600.00	882.00	48	45	280.00					600.00	882.00	48	47
Pennsylvania.....	350.00				900.00	1,250.00	34	29	350.00					900.00	1,250.00	36	35
Delaware.....	219.00				750.00	969.00	46	42	219.00					750.00	969.00	46	44
Maryland.....	210.00	55.00			900.00	1,165.00	40	37	210.00	55.00				900.00	1,165.00	41	38
District of Columbia.....	170.00		2.00		900.00	1,072.00	43	40	170.00		2.00			900.00	1,072.00	44	41
West Virginia.....	317.00	107.65			900.00	1,324.65	29	31	317.00	107.65	39.50			900.00	1,364.15	34	34
Southeastern:																	
Virginia.....	300.00	170.74			900.00	1,370.74	27	32	300.00	170.74				900.00	2,350.74	4	4
North Carolina.....	400.00	166.57			1,050.00	1,616.57	11	14	400.00	166.57				1,050.00	1,916.57	10	9
South Carolina.....	282.00	317.55			1,050.00	1,649.55	7	21	282.00	317.55	400.00			1,050.00	2,049.55	7	11
Georgia.....	135.00	185.55			975.00	1,295.55	30	36	135.00	185.55	25.00			975.00	1,448.05	28	33
Florida.....	218.10		.50		1,050.00	1,268.60	31	26	218.10		.50	300.00		1,050.00	1,606.60	20	16
Kentucky.....	525.00				1,050.00	1,575.00	14	7	525.00					1,050.00	1,742.50	14	10
Tennessee.....	75.00	310.44	1.00		1,050.00	1,436.44	22	35	75.00	310.44	17.50			1,050.00	2,036.44	8	12
Alabama.....	333.00	160.79			1,050.00	1,543.79	15	19	333.00	160.79	13.00			1,050.00	1,877.79	12	13
Mississippi.....																	
East Central:																	
Ohio.....	338.10	208.01	2.00	900.00	750.00	1,990.10	4	4	338.10	208.01	30.00			750.00	2,020.10	9	7
Indiana.....	265.00	75.58			600.00	1,073.01	42	47	265.00	75.58	24.00			600.00	1,097.01	43	46
Illinois.....	789.00				750.00	1,614.58	12	8	789.00					750.00	1,614.58	19	18
Michigan.....	333.45				900.00	1,233.45	35	30	333.45			180.00		900.00	1,413.45	31	28
Wisconsin.....	620.00				900.00	1,520.00	17	9	620.00		20.00			900.00	1,540.00	23	17
Minnesota.....	510.00		.50		750.00	1,260.50	33	28	510.00		7.50			750.00	1,268.00	35	32
Iowa.....	595.00				900.00	1,495.00	19	11	595.00		5.00			900.00	1,500.00	25	22
Missouri.....	507.00	75.89			450.00	1,032.89	45	43	507.00	75.89	25.00			450.00	1,057.89	45	43
Southwestern:																	
Arkansas.....	330.00	87.96			975.00	1,392.96	25	23	330.00	87.96	10.00			975.00	1,392.96	33	30
Louisiana.....	320.00				1,050.00	1,370.00	28	20	320.00					1,050.00	1,700.00	16	15
Oklahoma.....	486.00				750.00	1,461.00	21	13	486.00		4.50			750.00	1,465.50	27	23
Texas.....	336.50	119.80			750.00	1,206.30	36	39	336.50	119.80	11.00			750.00	1,217.30	37	40
West Central:																	
North Dakota.....	735.00		168.75		900.00	1,803.75	5	5	735.00		55.00			900.00	1,888.75	13	8
South Dakota.....	183.50		565.00		750.00	1,498.50	18	10	183.50		575.00			750.00	1,508.50	24	21
Nebraska.....	581.00	165.06			900.00	1,646.06	8	12	581.00	165.06	30.00			900.00	1,676.06	17	20
Kansas.....	545.00	186.66	10.00		750.00	1,491.66	20	24	545.00	186.66	10.00			750.00	1,491.66	26	31
Mountain:																	
Montana.....	220.00	356.05			1,050.00	1,626.05	9	25	220.00	356.05	255.00			1,050.00	1,881.05	11	19
Idaho.....	102.00			1,113.00	900.00	2,115.00	3	3	102.00			1,113.00		900.00	2,115.00	6	5
Wyoming.....	100.00	155.22	5.00		750.00	1,010.22	13	15	100.00	155.22	5.00			750.00	1,010.22	21	26
Colorado.....	22.50	155.22	1.00		900.00	1,178.72	1	1	22.50	155.22				900.00	1,178.72	2	2
New Mexico.....	205.80				900.00	1,105.80	41	38	205.80					900.00	1,105.80	42	39
Arizona.....	128.75	174.80			750.00	1,053.55	44	46	128.75	174.80				750.00	1,053.55	5	6
Utah.....	280.00	166.55			750.00	1,196.55	37	41	280.00	166.55	1,225.00			750.00	1,196.55	39	42
Nevada.....	85.50	222.65	332.30		900.00	1,540.45	16	22	85.50	222.65	332.30			900.00	1,540.45	22	29
Pacific:																	
Washington.....	325.00		101.50		975.00	1,401.50	24	18	325.00		42.00			975.00	1,443.50	29	24
Oregon.....	120.40			1,590.00	900.00	2,610.40	2	2	120.40			1,590.00		900.00	2,610.40	3	3
California.....	210.00		156.00		900.00	1,266.00	32	27	210.00		1,527.83			900.00	2,793.83	1	1

50,000-POUND GASOLINE-POWERED FOUR-AXLE TRACTOR-SEMITRAILER (No. 8)

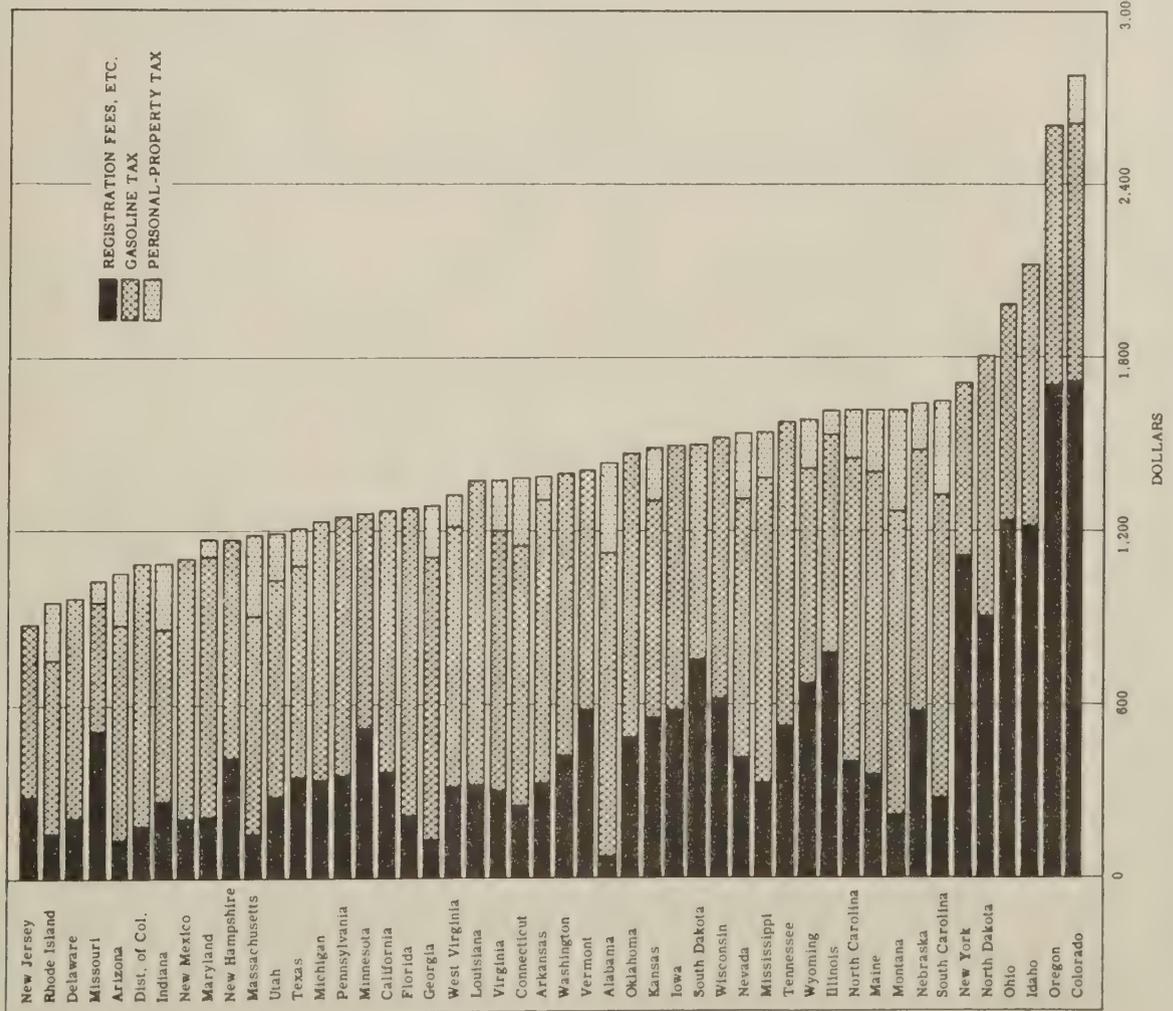
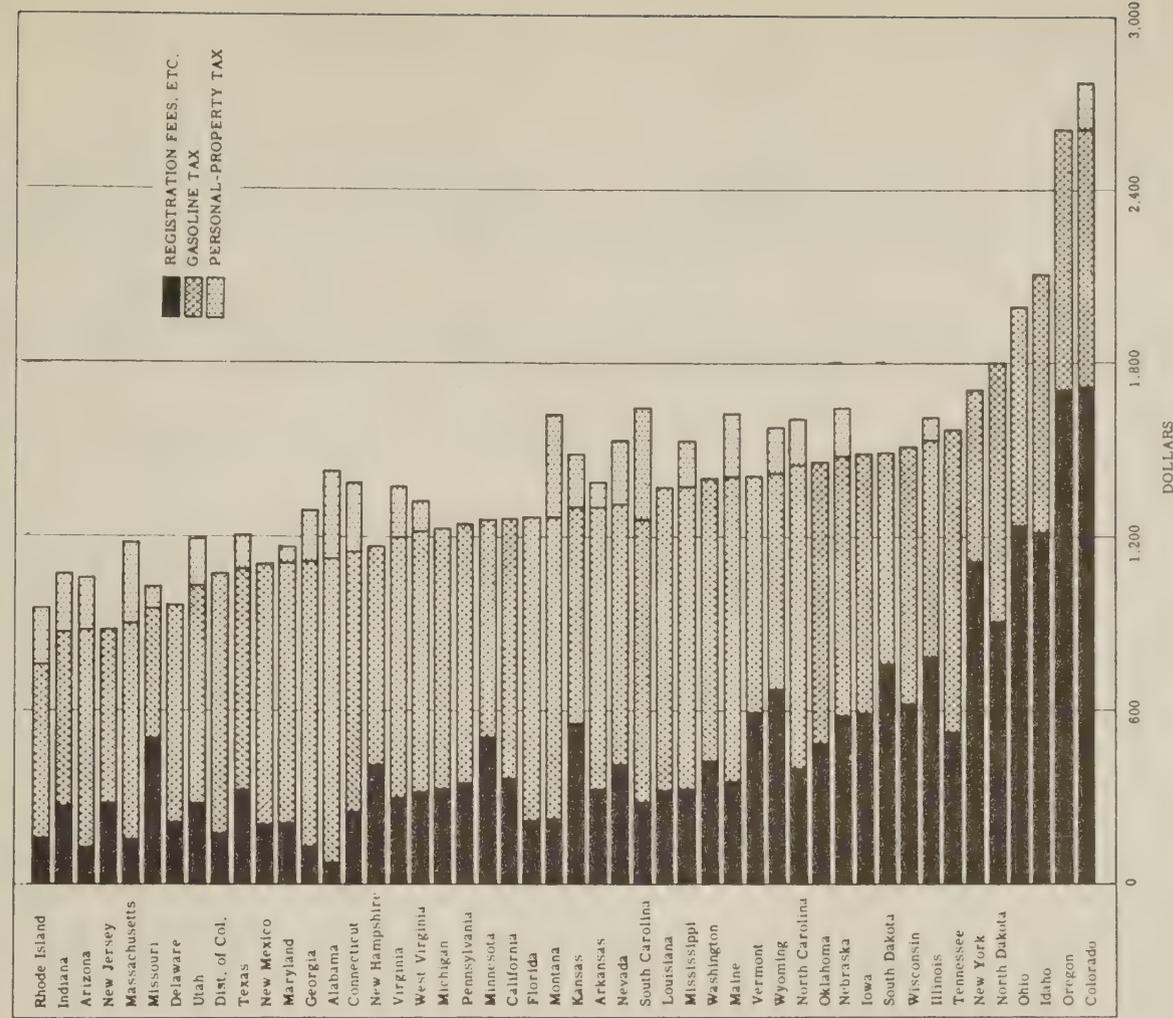


Figure 17.—State road-user and personal-property taxes on a 50,000-pound gasoline-powered four-axle tractor-semitrailer combination (No. 8) in private use, ranked according to total taxes (left) and road-user taxes (right).

Table 12.—Road-user and personal-property taxes on a diesel-powered, four-axle, tractor-semitrailer combination, 50,000 pounds gross vehicle weight (No. 9)

State	Private operation							Contract carrier								
	Registra- tion fee	Property tax	Other taxes and fees	Mileage or ton-mile tax	Diesel fuel tax	Total	Rank of State		Registra- tion fee	Property tax	Other taxes and fees	Mileage or ton-mile tax	Diesel fuel tax	Total	Rank of State	
							Total fees and taxes	Total, excluding property tax							Total fees and taxes	Total, excluding property tax
New England:																
Maine.....	\$355.00	\$317.81	\$170.59	---	\$700.00	\$1,372.81	12	23	\$355.00	\$317.81	---	---	\$700.00	\$1,402.81	18	29
New Hampshire.....	300.00	---	---	---	500.00	970.59	37	28	300.00	---	---	---	500.00	972.59	40	35
Vermont.....	1,165.00	---	---	---	---	1,165.00	24	13	1,165.00	---	---	---	---	1,165.00	31	25
Massachusetts.....	152.00	419.00	---	---	500.00	1,071.00	30	47	152.00	419.00	---	---	500.00	1,086.00	34	47
Rhode Island.....	155.00	293.81	---	---	400.00	848.81	45	48	155.00	293.81	---	---	400.00	853.81	45	48
Connecticut.....	250.00	411.16	---	---	600.00	1,261.16	19	36	250.00	411.16	---	---	600.00	1,266.16	27	39
Middle Atlantic:																
New York.....	300.00	---	---	\$816.00	600.00	1,716.00	5	5	300.00	---	---	---	600.00	1,716.00	10	8
New Jersey.....	280.00	---	2.00	---	400.00	682.00	48	44	280.00	---	---	---	400.00	682.00	48	46
Pennsylvania.....	350.00	---	---	---	600.00	950.00	39	31	350.00	---	---	---	600.00	950.00	41	37
Delaware.....	219.00	---	---	---	500.00	719.00	47	43	219.00	---	---	---	500.00	719.00	47	44
Maryland.....	210.00	55.00	---	---	600.00	865.00	43	39	210.00	55.00	---	---	600.00	865.00	43	42
District of Columbia.....	214.00	---	2.00	---	600.00	816.00	46	38	214.00	---	2.00	---	600.00	816.00	46	41
West Virginia.....	317.00	106.20	---	---	600.00	1,023.20	33	33	317.00	106.20	---	---	600.00	1,062.70	36	36
Southeastern:																
Virginia.....	300.00	250.21	---	---	600.00	1,150.21	26	34	300.00	250.21	---	---	600.00	1,150.21	5	5
North Carolina.....	400.00	226.73	---	---	700.00	1,326.73	15	21	400.00	226.73	---	---	700.00	1,326.73	13	11
South Carolina.....	262.00	362.92	---	---	700.00	1,324.92	16	30	262.00	362.92	---	---	700.00	1,324.92	11	17
Georgia.....	190.00	240.50	---	---	650.00	1,080.50	29	37	190.00	240.50	---	---	650.00	1,080.50	26	31
Florida.....	246.10	---	.50	---	700.00	946.60	40	32	246.10	---	.50	---	700.00	946.60	25	19
Kentucky.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tennessee.....	525.00	455.04	1.00	---	700.00	1,725.04	21	11	525.00	455.04	---	---	700.00	1,725.04	7	13
Alabama.....	333.00	160.79	---	---	800.00	1,293.79	18	18	333.00	160.79	---	---	800.00	1,293.79	12	10
Mississippi.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
East Central:																
Ohio.....	391.30	316.19	2.00	900.00	500.00	1,793.30	4	4	391.30	316.19	2.00	900.00	500.00	1,823.30	8	6
Indiana.....	265.00	122.48	---	---	400.00	981.19	36	46	265.00	122.48	---	---	400.00	981.19	39	45
Illinois.....	780.00	---	---	---	500.00	1,411.48	10	9	780.00	---	---	---	500.00	1,411.48	17	20
Michigan.....	370.50	---	---	---	600.00	970.50	38	29	370.50	---	---	---	600.00	970.50	32	27
Wisconsin.....	620.00	---	---	---	600.00	1,220.00	22	12	620.00	---	---	---	600.00	1,220.00	28	22
Minnesota.....	510.00	---	.50	---	500.00	1,010.50	35	25	510.00	---	.50	---	500.00	1,010.50	38	32
Iowa.....	595.00	---	---	---	700.00	1,295.00	17	8	595.00	---	---	---	700.00	1,295.00	24	18
Missouri.....	507.00	100.41	---	---	300.00	907.41	42	40	507.00	100.41	---	---	300.00	932.41	42	40
Southwestern:																
Arkansas.....	330.00	87.96	---	---	650.00	1,067.96	31	27	330.00	87.96	---	---	650.00	1,067.96	35	34
Louisiana.....	320.00	---	---	---	700.00	1,020.00	34	24	320.00	---	---	---	700.00	1,020.00	23	16
Oklahoma.....	476.00	---	---	---	650.00	1,126.00	28	19	476.00	---	---	---	650.00	1,126.00	33	28
Texas.....	352.60	163.67	---	---	650.00	1,166.27	23	26	352.60	163.67	---	---	650.00	1,177.27	30	33
West Central:																
North Dakota.....	735.00	---	168.75	---	600.00	1,503.75	8	6	735.00	---	168.75	---	600.00	1,558.75	14	9
South Dakota.....	294.50	---	565.00	---	500.00	1,359.50	13	7	294.50	---	565.00	---	500.00	1,389.50	22	14
Nebraska.....	546.00	211.92	---	---	600.00	1,357.92	14	16	546.00	211.92	---	---	600.00	1,387.92	21	24
Kansas.....	545.00	265.78	10.00	---	700.00	1,520.78	7	10	545.00	265.78	10.00	---	700.00	1,520.78	15	21
Mountain:																
Montana.....	220.00	521.76	---	---	900.00	1,641.76	6	20	220.00	521.76	---	---	900.00	1,886.76	6	15
Idaho.....	102.00	---	---	1,113.00	600.00	1,815.00	3	3	102.00	---	---	1,113.00	600.00	1,815.00	9	7
Wyoming.....	120.00	227.46	5.00	---	400.00	852.46	11	14	120.00	227.46	5.00	---	400.00	1,391.46	20	26
Colorado.....	22.50	227.46	1.00	1,665.20	600.00	2,516.16	2	2	22.50	227.46	1.00	1,665.20	600.00	2,516.16	3	3
New Mexico.....	256.50	---	---	---	600.00	856.50	44	35	256.50	---	---	---	600.00	856.50	44	38
Arizona.....	175.50	256.00	---	---	500.00	931.50	41	45	175.50	256.00	---	---	500.00	931.50	4	4
Utah.....	280.00	273.26	---	---	500.00	1,053.26	32	41	280.00	273.26	---	---	500.00	1,053.26	37	43
Nevada.....	95.50	355.05	369.90	---	600.00	1,420.45	9	22	95.50	355.05	369.90	---	600.00	1,420.45	16	30
Pacific:																
Washington.....	356.25	---	137.30	---	650.00	1,143.55	27	17	356.25	---	137.30	---	650.00	1,185.55	29	23
Oregon.....	133.70	---	---	---	---	2,533.70	1	1	133.70	---	---	---	---	2,533.70	2	2
California.....	243.00	---	217.00	---	---	1,160.00	25	15	243.00	---	217.00	---	---	2,611.83	1	1

50,000-POUND DIESEL-POWERED FOUR-AXLE TRACTOR-SEMITRAILER (No. 9)

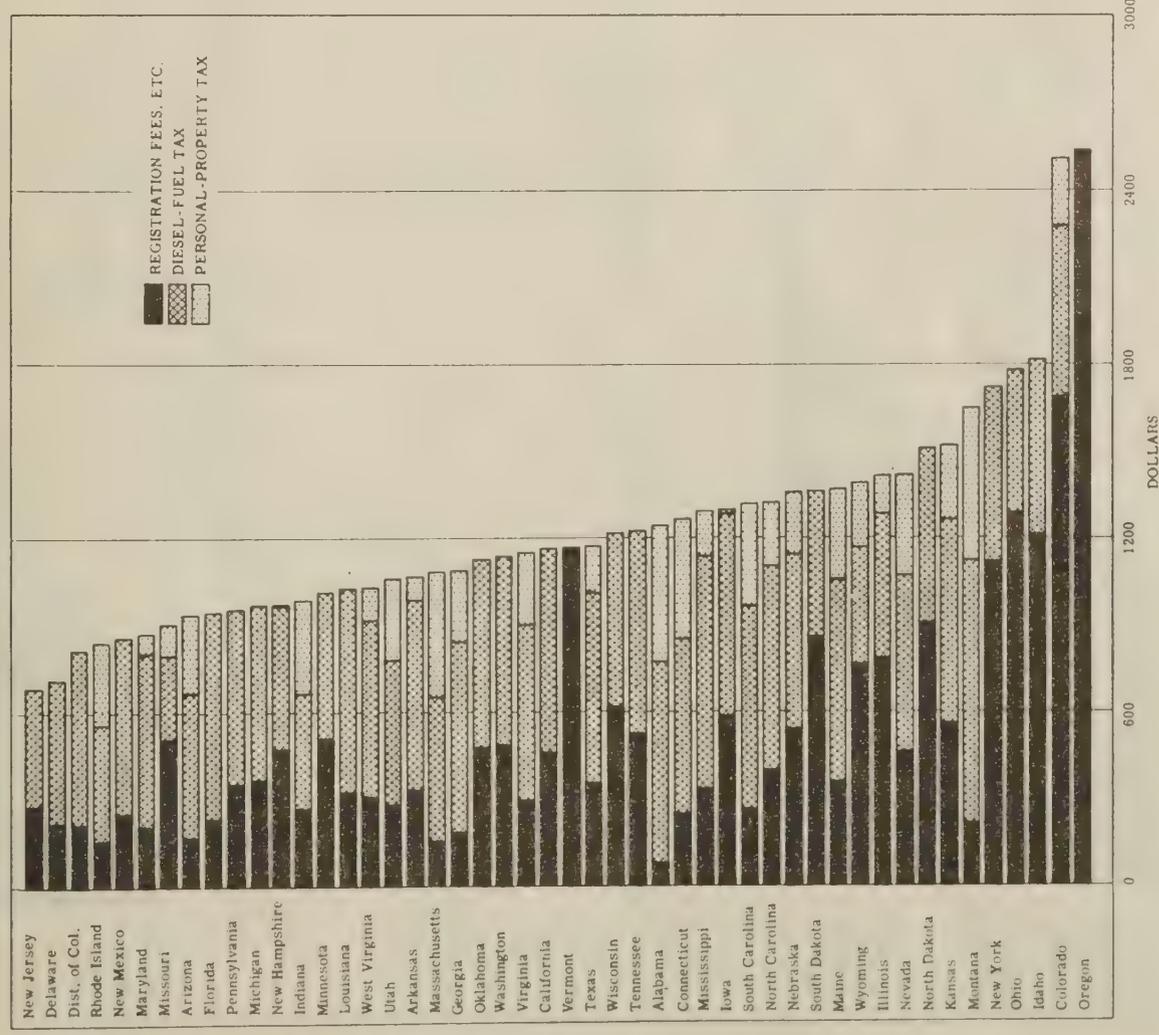
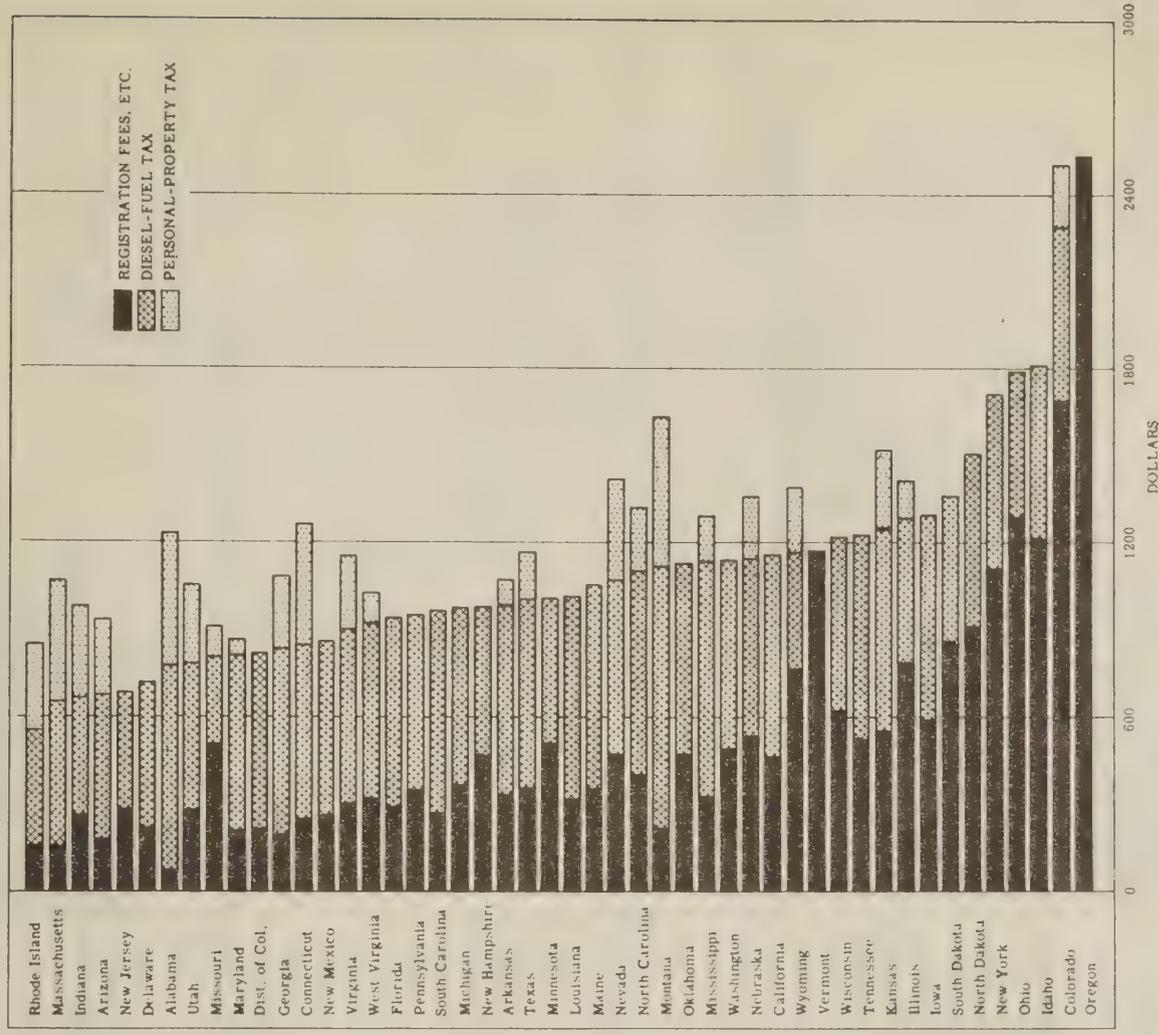


Figure 18.—State road-user and personal-property taxes on a 50,000-pound diesel-powered four-axle tractor-semitrailer combination (No. 9) in private use, ranked according to total taxes (left) and road-user taxes (right).

62,000-POUND DIESEL-POWERED FIVE-AXLE TRACTOR-SEMITRAILER (No. 10)

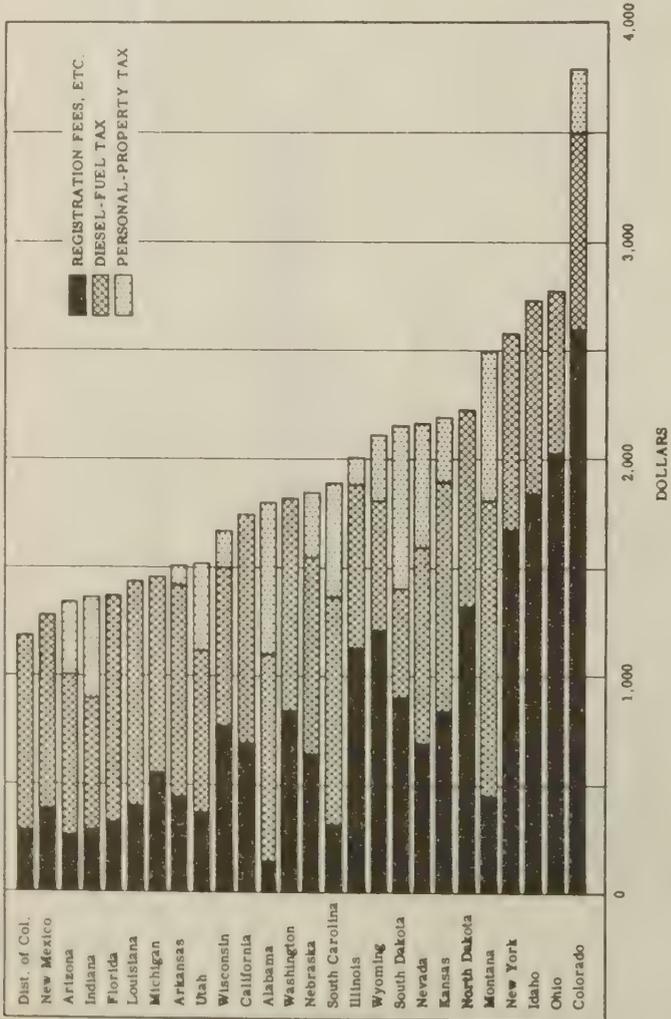
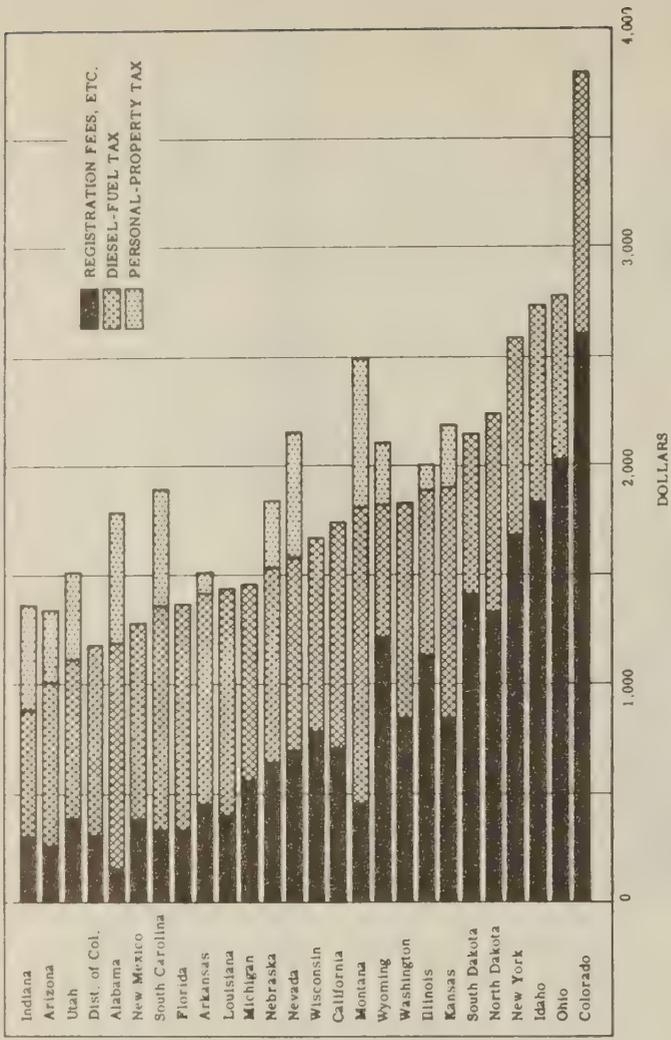


Figure 19.—State road-user and personal-property taxes on a 62,000-pound diesel-powered five-axle tractor-semitrailer combination (No. 10) in private use, ranked according to total taxes (left) and road-user taxes (right).

72,000-POUND DIESEL-POWERED FIVE-AXLE TRACTOR-SEMITRAILER AND FULL TRAILER (No. 11)

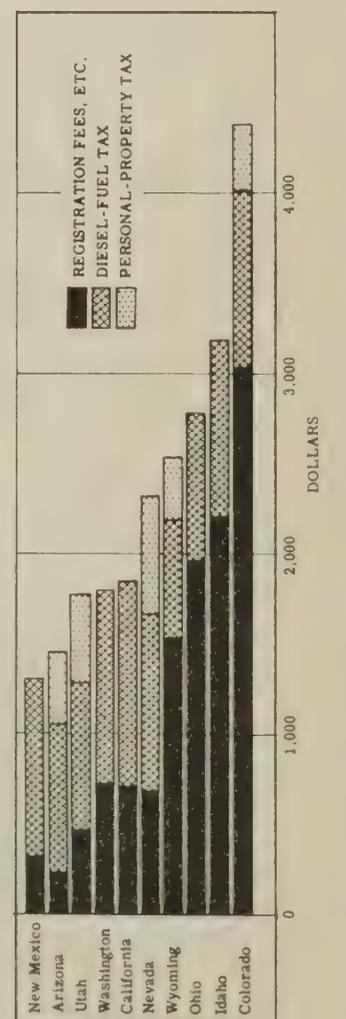
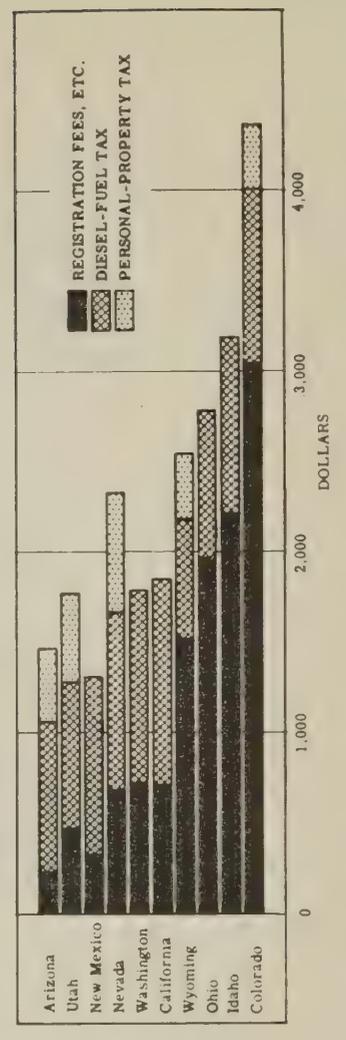


Figure 20.—State road-user and personal-property taxes on a 72,000-pound diesel-powered five-axle tractor-semitrailer and full trailer combination (No. 11) in private use, ranked according to total taxes (left) and road-user taxes (right).

Table 13.—Road-user and personal-property taxes on heavy combinations (diesel-powered)

State	Private operation						Contract carrier								
	Regis- tration fee	Property tax	Other taxes and fees	Mileage or ton-mile tax	Diesel fuel tax	Total	Rank of State Total fees and taxes	Regis- tration fee	Property tax	Other taxes and fees	Carrier taxes and fees	Mileage or ton-mile tax	Diesel fuel tax	Total	Rank of State Total fees and taxes
FIVE-AXLE TRACTOR-SEMITRAILER COMBINATION, 62,000 POUNDS GROSS VEHICLE WEIGHT (No. 10)															
New York	\$396.00	---	---	\$1,288.00	\$893.64	\$2,577.64	4	\$396.00	---	---	---	\$1,288.00	\$893.64	\$2,577.64	6
District of Columbia	294.00	---	---	---	893.64	1,189.64	23	294.00	---	---	---	---	893.64	1,189.64	24
South Carolina	327.00	\$527.50	---	---	1,042.58	1,897.08	12	327.00	---	\$400.00	---	---	1,042.58	2,297.08	9
Florida	329.50	---	.50	---	1,042.58	1,372.58	22	377.00	---	.50	---	---	1,042.58	1,770.58	16
Alabama	150.00	603.24	1.00	1,400.00	1,042.58	2,774.95	15	150.00	603.24	1.00	30.00	1,400.00	1,042.58	2,671.82	7
Ohio	628.25	475.53	2.00	---	744.70	2,774.95	2	628.25	2.00	---	---	---	744.70	2,804.95	3
Indiana	300.00	475.53	---	---	595.76	1,371.29	23	300.00	475.53	---	24.00	---	595.76	1,395.29	24
Illinois	1,139.00	127.27	---	---	744.70	2,010.97	11	1,139.00	127.27	---	---	---	744.70	2,010.97	15
Michigan	567.75	---	---	---	893.64	1,461.39	20	567.75	---	---	---	---	893.64	1,741.39	12
Wisconsin	780.00	---	---	---	893.64	1,673.64	17	780.00	---	20.00	---	---	893.64	1,741.39	18
Arkansas	455.00	87.96	---	---	968.11	1,511.07	13	455.00	87.96	---	---	---	968.11	1,511.07	21
Louisiana	400.00	---	---	---	1,042.58	1,442.58	19	800.00	---	10.00	---	---	1,042.58	1,852.58	14
Norin Dakota	1,130.00	---	289.25	---	893.64	2,232.89	6	1,130.00	---	55.00	---	---	893.64	2,287.89	10
South Dakota	679.50	730.00	---	---	744.70	2,154.20	9	679.50	730.00	---	740.00	---	744.70	2,164.20	7
Nebraska	651.00	300.39	---	---	893.64	1,845.03	13	651.00	300.39	---	30.00	---	893.64	1,875.03	16
Kansas	845.00	288.73	10.00	---	1,042.58	2,186.31	7	845.00	288.73	10.00	---	---	1,042.58	2,186.31	11
Montana	465.00	691.86	---	---	340.46	2,497.32	5	465.00	691.86	---	360.00	---	340.46	2,857.32	4
Idaho	102.00	---	---	---	893.64	2,735.14	3	102.00	---	---	---	---	893.64	2,735.14	8
Wyoming	200.00	301.61	5.00	1,739.50	595.76	2,113.53	10	200.00	301.61	5.00	---	1,739.50	595.76	2,735.14	5
Colorado	22.50	301.61	1.00	2,578.42	893.64	3,797.17	1	22.50	301.61	1.00	---	2,578.42	893.64	3,797.17	14
New Mexico	387.50	---	---	---	893.64	1,281.14	25	387.50	---	---	---	---	893.64	1,281.14	2
Arizona	264.25	339.20	---	---	744.70	1,348.15	24	264.25	339.20	---	1,750.00	---	744.70	3,098.15	25
Utah	380.00	390.79	---	---	744.70	1,515.49	18	380.00	390.79	---	---	---	744.70	1,515.49	3
Nevada	132.50	565.55	567.90	---	893.64	2,159.59	8	132.50	565.55	567.90	---	---	893.64	2,159.59	22
Washington	662.50	---	193.70	---	968.11	1,824.31	14	662.50	---	193.70	47.00	---	968.11	1,871.31	13
California	423.00	---	283.00	---	1,042.58	1,748.58	16	423.00	---	283.00	2,139.33	---	1,042.58	3,887.91	1
FIVE-AXLE TRACTOR-SEMITRAILER AND FULL TRAILER COMBINATION, 72,000 POUNDS GROSS VEHICLE WEIGHT (No. 11)															
Ohio	\$557.35	---	\$2.00	\$1,400.00	\$813.95	\$2,773.30	3	\$557.35	---	\$2.00	\$30.00	\$1,400.00	\$813.95	\$2,803.30	5
Idaho	104.00	---	---	---	976.74	3,187.74	2	104.00	---	---	---	---	976.74	3,187.74	4
W. yoming	170.00	\$358.94	7.50	2,107.00	651.16	2,540.39	4	170.00	\$358.94	7.50	---	2,107.00	651.16	2,540.39	4
Colorado	27.50	358.94	1.00	3,014.46	976.74	4,378.64	1	27.50	358.94	1.00	---	3,014.46	976.74	4,378.64	6
New Mexico	336.90	---	---	---	976.74	1,313.64	10	336.90	---	---	---	---	976.74	1,313.64	2
Arizona	289.90	403.80	---	---	813.95	1,457.65	9	289.90	403.80	---	1,975.00	---	813.95	3,677.75	3
Utah	470.00	477.31	---	---	813.95	1,761.26	8	470.00	477.31	---	---	---	813.95	1,761.26	9
Nevada	137.50	673.00	542.50	---	976.74	2,329.74	5	137.50	673.00	542.50	---	---	976.74	2,329.74	10
Washington	530.00	---	192.00	---	1,058.14	1,780.14	7	530.00	---	192.00	61.00	---	1,058.14	1,841.14	8
California	364.00	---	346.00	---	1,139.53	1,849.53	6	364.00	---	346.00	2,454.17	---	1,139.53	4,303.70	7

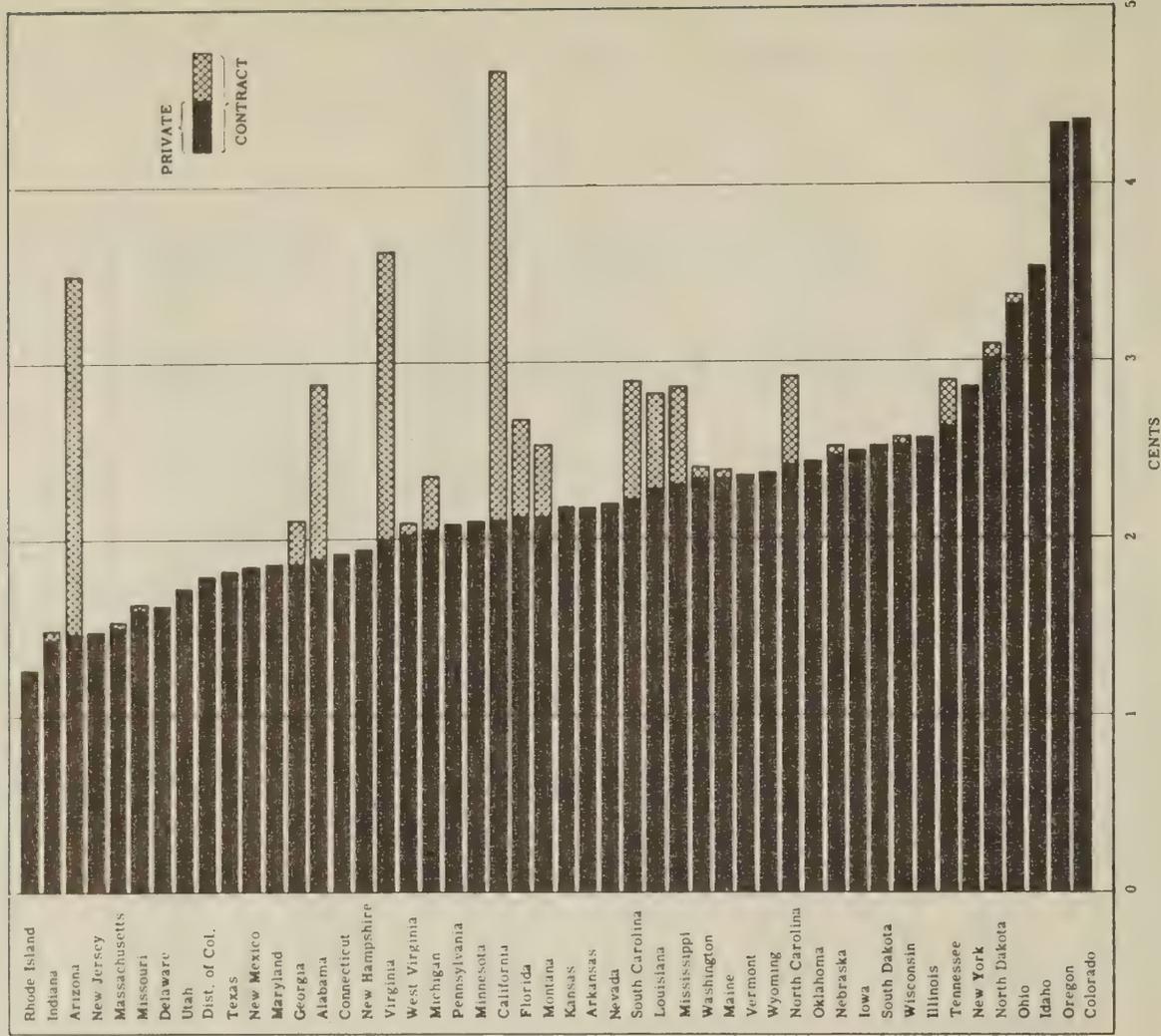
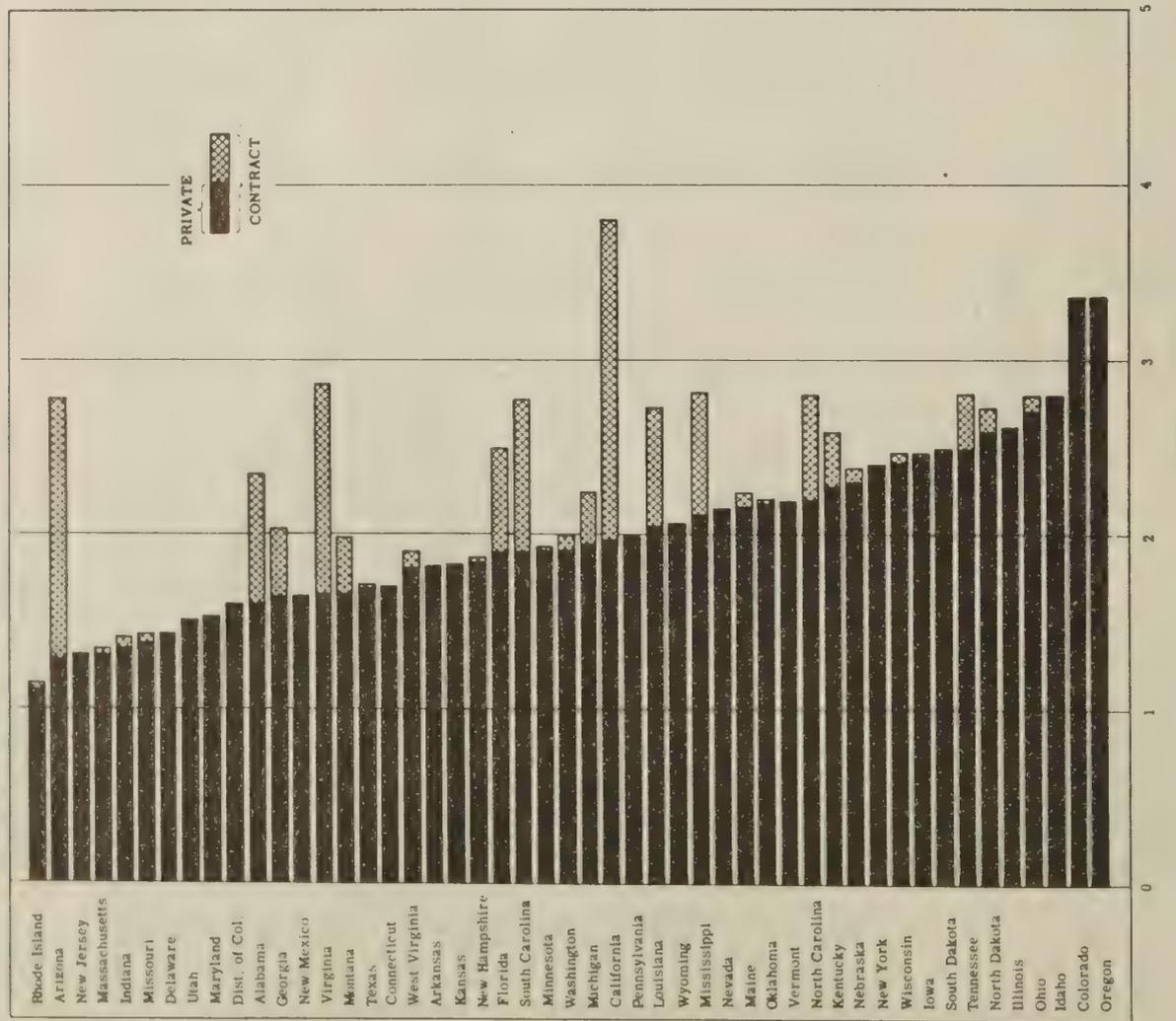


Figure 21.—Comparison of State road-user taxes (personal-property taxes not included), in cents per mile for private use and contract operation, for a 40,000-pound three-axle tractor-semitrailer (No. 7) (left) and a 50,000-pound gasoline-powered four-axle tractor-semitrailer (No. 8) (right).

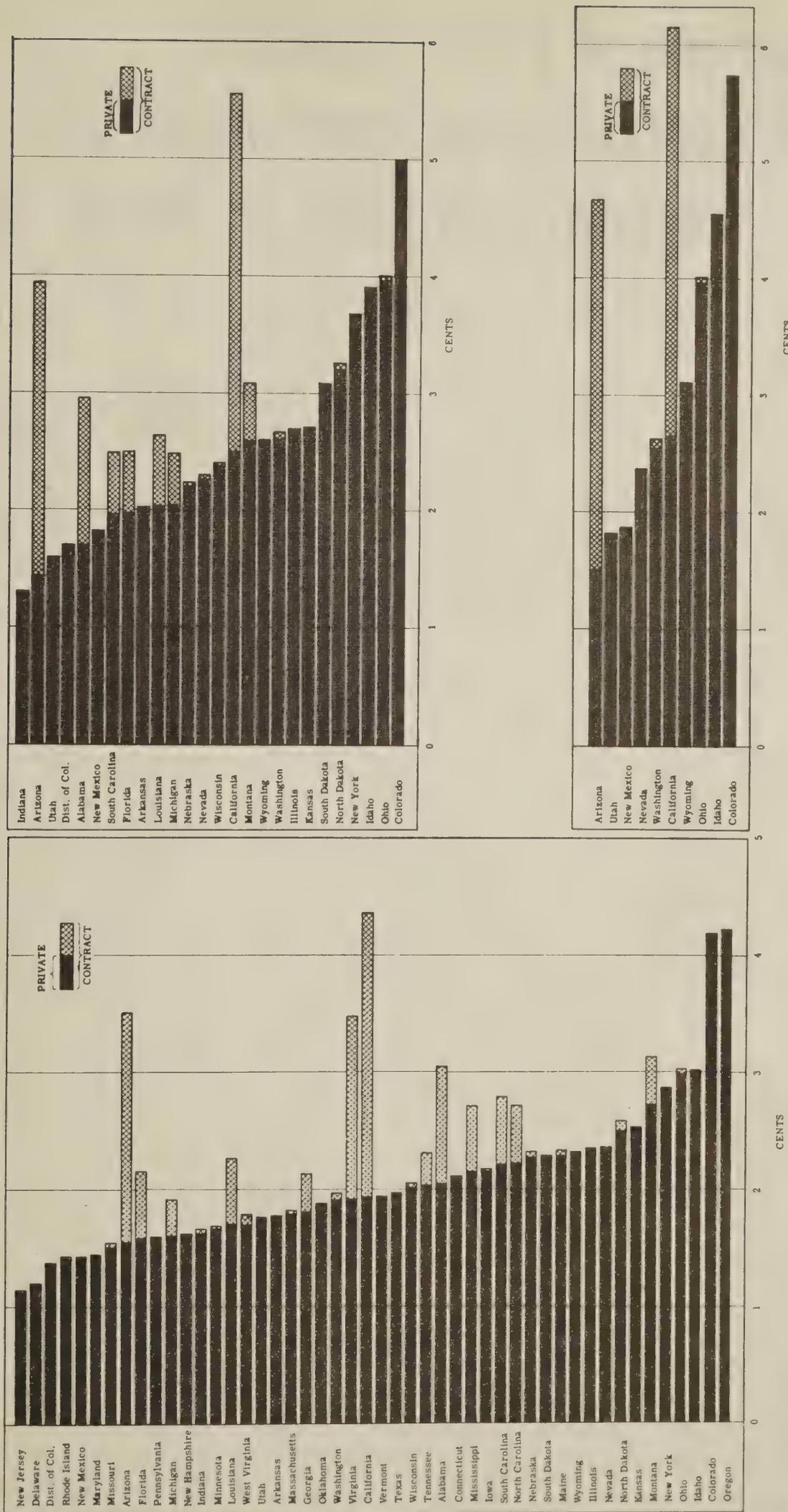


Figure 22.—Comparison of State road-user taxes (personal-property taxes not included), in cents per mile for private use and contract operation, for a 50,000-pound diesel-powered four-axle tractor-semitrailer (No. 9) (left); a 62,000-pound diesel-powered five-axle tractor-semitrailer (No. 10) (upper right); and a 72,000-pound diesel-powered five-axle tractor-semitrailer and full trailer (No. 11) (lower right).

# Cost Comparison of Force Account and Contract Construction on Five Secondary Projects in North Carolina

BY THE FINANCIAL AND ADMINISTRATIVE RESEARCH BRANCH  
BUREAU OF PUBLIC ROADS

Reported<sup>1</sup> by

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*This article presents the results of comprehensive job cost studies made on three contract and two force account secondary road projects in North Carolina during 1952 and 1953. A complete study of the relative merits of contract and force account methods would require a much wider coverage of kinds and conditions of highway work. Additionally, it would be necessary that social and economic benefits of the two methods be analyzed, that inherent managerial and operational advantages of each method be carefully weighed, and that policy considerations be reviewed. These broader phases of the problem are not part of this study. It is essential that this fact be recognized in appraising the findings presented herein.*

*This article is published because of its widespread general interest rather than for any current importance it has in North Carolina. The findings of this study may be of considerable value to other countries where the force account method is a more common practice than in the United States.*

BOTH the contract and force account methods of doing highway construction and maintenance work have their place in the pattern of highway development. In general, the contract method prevails in construction where standards of materials and performance are specified and controlled, and items of work are planned for construction and measurement. Maintenance work is generally done by the force account method, but there is a definite trend to do a greater percentage by the contract method.

Even though there may be general acceptance of the traditional policy of doing construction by contract, it does not preclude an occasional examination of doing work by the force account method. When judiciously managed, the latter method can be a stabilizing influence in situations where the contract mechanism falls short of meeting its full obli-

gation. Such a situation could be brought about by a rapid increase in volume of highway work accompanied by a shortage of contractors, lack of competition, and rising prices. These were among the factors that concerned the North Carolina State Highway and Public Works Commission after the State undertook its expanded program of secondary road construction in 1949.

This secondary road construction program involved the expenditure of \$200 million over a 4-year period. The North Carolina State Highway and Public Works Commission, which has jurisdiction over all rural roads, elected to do a substantial portion of the construction program with its own forces and proceeded to purchase about \$5 million of additional road equipment. Legal steps were taken by outside parties, without success, to block such purchases and to require that all construction be done by contract.

Still later, use of Federal-aid secondary funds in constructing some of the secondary projects with State forces was requested. Subsequent arrangements provided that several of these projects would be set up and constructed by either contract or State force methods. It was further agreed that the Bureau of Public Roads would make cost studies on these projects. The number of projects involved was eventually reduced to five by contract and three by State forces. Of these, three contract and two force account projects were selected by the Bureau of Public Roads for detailed unit cost studies during 1952 and 1953. The five projects, totaling about 41 miles in length and costing about \$735,000, were situated in central North Carolina.

The purpose of these studies was to develop facts on the comparative costs of the two methods of doing work. It was generally accepted that the usefulness of the study results would be principally in furnishing certain factual background on each method, in minimizing unsubstantiated claims as to excessive economies of one method over the other, and in keeping the main issues involved from being complicated by minor unresolved details.

## Pertinent Items

The results presented relate only to the five projects studied. They should not be viewed as being specifically applicable to all contract and force account construction. The following items are pertinent:

1. Construction work on each job appeared to reflect normal patterns of operation. There was no evidence of special efforts to make a "good showing."

2. Quality of completed work seemed to be about the same on all jobs.

3. Contractors obtained their aggregates from commercial sources; the State produced most aggregates in its own local quarries. The cost comparison reflects these conditions as they existed. No adjustment was made on the basis of assuming common sources of aggregates or other materials.

4. The several jobs studied were reasonably typical with respect to terrain and general nature of the work.

5. Identical cost-keeping procedures were employed on each of the five jobs. All field data were obtained by Bureau of Public Roads' personnel. They kept a daily record of the time spent by each employee and each unit of equipment on each work item. The contractors and the State made all of their records available to study personnel.

6. For purposes of this cost comparison, a uniform schedule of depreciation rates was applied to each job, contract and force account. Separate rates were established for each major class of equipment. These rates were then applied to the original purchase price for the period that the equipment was on the job. The depreciation, thus computed, was distributed according to working time spent on each operation performed.

7. In the case of contractors, time and one-half was paid any hourly personnel for work in excess of 40 hours per week. State employees paid on an hourly basis did not work any hours over the scheduled 55 per week and no overtime was paid for hours worked in excess of 40 per week. The retroactive pay increase granted State employees near the close of this study has not been included in the cost data developed in this article.

<sup>1</sup> This article was presented at the 35th Annual Meeting of the Highway Research Board, Wash., D. C., Jan. 1956.

**Table 1.—Example for a single bid item (grading on a mileage basis) showing typical manner in which labor expense and equipment time were kept by work accounts**

Cost element	Work accounts							Total
	Grading on a mileage basis, undistributed	Clearing and grubbing with-in right-of-way	Common excavation	Rock excavation	Drilling and blasting	Building fill	Maintenance for traffic	
<b>LABOR EXPENSE</b>								
Direct wages.....	\$2,492.23	\$4,254.19	\$1,053.40		\$673.38	\$616.10	\$163.11	\$9,252.41
Equipment operation.....	67.64	561.96	5,608.91	\$442.29	156.15	227.24	259.37	7,323.56
Equipment maintenance and repair wages.....	27.90	89.83	1,553.60	91.83	88.10	37.86	58.89	1,948.01
Liability and compensation insurance.....	104.69	305.60	311.16	17.97	46.74	48.59	19.23	853.98
Social security payments.....	64.80	122.85	205.73	13.38	22.98	22.07	12.05	463.86
Leave and holiday charges.....	72.72	137.86	230.87	15.01	25.79	24.76	13.53	520.54
<b>Total.....</b>	<b>2,829.98</b>	<b>5,472.29</b>	<b>8,963.67</b>	<b>580.48</b>	<b>1,013.14</b>	<b>976.62</b>	<b>526.18</b>	<b>20,362.36</b>
<b>EQUIPMENT TIME—NET WORKING HOURS</b>								
Crawler tractors.....		74.1	573.9	161.1	29.3	67.1	7.1	912.6
Scraper, self propelled.....	9.8		557.7	20.0	5.5		3.3	596.3
Motor graders.....			992.3		11.6	12.4	96.6	1,112.9
Shovels, draglines, and backhoes.....	1.3	67.3	166.9					235.5
Dump trucks.....	9.5	161.9	181.0		13.2			365.6
Industrial rubber-tired tractor.....					4.7	10.0		14.7
Rollers.....						13.3		13.3
Compressors.....			7.7		121.8	13.7		143.2
Loaders.....			12.5					12.5

8. Any expense on a unit of equipment during its retention on the job was handled as a project cost.

9. Final costs which were developed for both the State and the contractors include an allowance for interest on invested capital. No allowance was made for any profit on the contract. The cost figures, of course, contain each job's on-project overhead and a pro rata share of off-project overhead expense, including salaries and expenses of management personnel. (A \$7,500 annual salary rate was allowed for the owners of unincorporated contractor organizations in determining management expense.)

### Bid Items and Work Accounts

The principal items involved in the estimates, bids, and payments on the cost study projects were as follows:

Bid item	Unit
Grading on a mileage basis.....	Lump sum cost per mile.
Drainage ditch excavation.....	Cubic yards (outside of the typical roadway section).
Excavation, borrow.....	Cubic yards.
Base course.....	Cubic yards, in place.
Bituminous surface treatment.....	Square yards.
Culvert pipe.....	Lineal feet, by individual sizes of each type.

At the outset of the cost study, it was determined that additional breakdowns would be needed for several of the bid items, particularly in those cases where an item was bid as a lump sum or where certain variables, such as haul distance, might account for measurable differences in costs between jobs. Each bid item was therefore subdivided to the extent necessary to show these differences. These breakdowns are called "work accounts."

For example, one of the bid items on each of the jobs was "grading on a mileage basis." This particular item was, in effect, a lump sum cost per mile, and included clearing and grubbing. There was also some clearing and

grubbing for borrow pits, material pits, drainage ditches, and other areas outside the typical cross section that was handled by separate bid items. For the purpose of the cost study, therefore, this lump sum grading item was broken down into several work accounts as shown in table 1.

Table 1 is not complete; it simply illustrates the manner in which the work accounts were set up. The upper half of the table shows typical entries for the labor expense elements. These entries were processed from the daily time records kept by study personnel for each man who worked on the grading item at any time during the course of the job. The lower half of the table shows the working time, by classes of equipment, summarized from daily time records kept on each individual unit of equipment. Similar breakdowns were made showing charges to each work account for materials, supplies, services, taxes, depreciation, and so on.

Study personnel also made field measurements of the quantities of work performed on each work account. In the case of grading on a mileage basis, measurements were made of clearing and grubbing, cubic yards of common excavation, and cubic yards of rock excavation involved in this one item. By such means, the costs and corresponding quantities

**Table 2.—Average unit costs for State and contract work for work accounts included in the composite job**

Work account	Unit cost <sup>1</sup>	
	State jobs	Contract jobs
Clearing and grubbing..... acre.....	\$687.00	\$391.00
Excavation..... cubic yard.....	.368	.360
Base course:		
Materials <sup>2</sup> ..... do.....	2.13	1.87
Hauling..... ton-mile.....	.074	.069
Manipulation..... square yard.....	.095	.106
Bituminous surface treatment..... do.....	.292	.367
15-inch plain concrete pipe..... lineal foot.....	2.20	2.11
18-inch plain concrete pipe..... do.....	4.05	3.78
24-inch plain concrete pipe..... do.....	5.00	5.94

<sup>1</sup> Arithmetic averages. <sup>2</sup> On trucks at loading site.

for any work account could be segregated or grouped in various ways to show the principal cost differences between jobs.

To determine the relative costs of doing work by either of the two construction methods, contract or force account, a common base of reference was established. This was done by setting up a hypothetical composite job consisting of typical quantities for the principal work accounts. The relative costs of construction were then determined by applying average unit costs for the two methods to the quantities in the composite job.

### Composite Job Cost, Unadjusted

The assumed quantities for the principal work accounts of the composite job are as follows:

Work account	Quantity
Clearing and grubbing.....	20 acres.
Excavation.....	85,000 cubic yards.
Base course:	
Material.....	15,000 cubic yards.
Hauling.....	300,000 ton-miles.
Manipulation.....	80,000 square yards.
Bituminous surface treatment.....	80,000 square yards.
15-inch plain concrete pipe.....	1,000 lineal feet.
18-inch plain concrete pipe.....	1,500 lineal feet.
24-inch plain concrete pipe.....	300 lineal feet.

The above rounded quantities account for over 90 percent of the work on a typical secondary road project of the types studied. Arithmetic averages of the final unit costs for each work account, shown separately for the State and contract jobs, are given in table 2.

Application of these unit costs to the quantities for the composite job gives the following totals:

Total cost of composite job, using State's average unit costs.....	\$139,905
Total cost of composite job, using contractors' average unit costs, and excluding profit.....	134,572

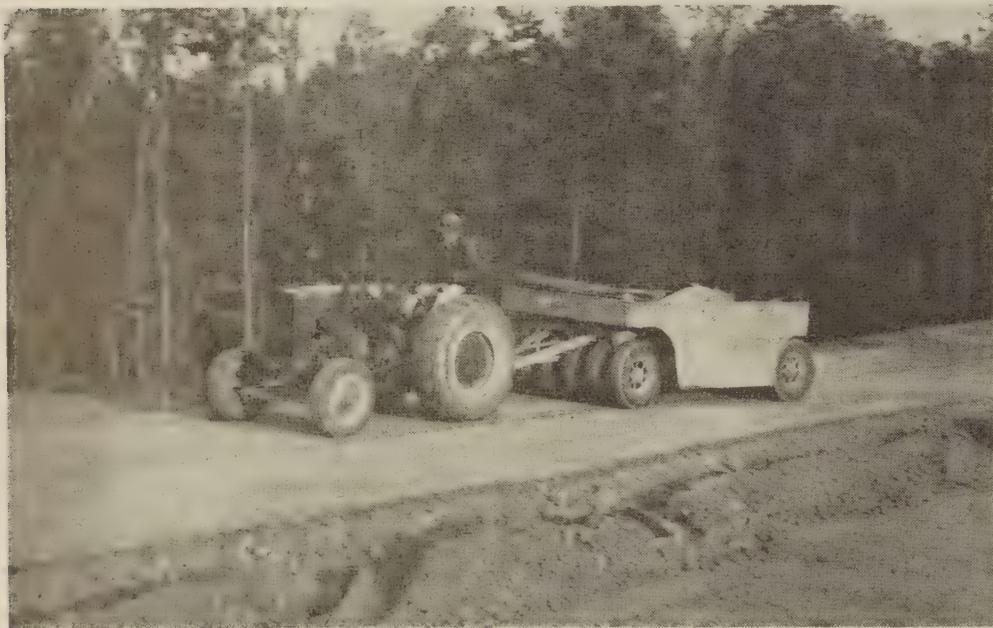
Because of the differing unit costs on the individual jobs, the difference of about 4 percent in favor of contract work is not wholly conclusive. For example, when the separate unit costs for each of the five study projects are applied to the quantities for the composite job, it is found that the total cost of the State force jobs was \$128,400 and \$151,700, and the contract jobs ranged between \$131,600 and \$137,800.

### Composite Job Cost, Adjusted

The unit costs listed in table 2 represent actual study results, unadjusted for differing job conditions and for certain items of expense,



Fill being built on new location to bridge abutment in background.



Roller used for compacting sand base.

such as taxes, which are borne in varying amounts on force account and contract work. Certain of these conditions and items of expense can be readily evaluated, whereas others can only be approximated. For example, the tax on gasoline can be precisely determined as can the amount of the wage differential between the jobs. In the latter case, however, there is no direct method of measuring the effect of the wage differential on labor productivity.

There is the problem, too, of the compounding effect of a series of adjustments. An adjustment in dollar amounts of one account, such as that involved in equalizing haul distances, will affect dollar amounts of such cost elements as tax payments and interest on the investment. No attempt has been made in this article to analyze these interrelationships. Rather, each adjustment has been computed separately so as to show its particular total dollar amount that is included in the original unadjusted total cost of the composite job.

Included in the costs of the composite job are certain taxes, fees, assessments, and con-

tributions which are incurred as direct and indirect expenses to varying degrees on State force and contract work. Theoretically these items may be viewed as costs which are borne, directly or indirectly, regardless of how the work is performed, whether by State forces or by contract. Hence, it is appropriate to make a comparison with all such determinable costs

Table 3.—Group I (taxes, fees, and assessments) and Group II (insurance and labor benefits) items expressed as a percentage of the total cost of individual work accounts in the composite job

Work account	Group I items <sup>1</sup>		Group II items <sup>1</sup>	
	State jobs	Contract jobs	State jobs	Contract jobs
Clearing and grubbing .....	Percent 0.35	Percent 7.43	Percent 2.51	Percent 2.17
Excavation .....	.43	5.53	4.18	1.37
Base course:				
Materials .....	.17	11.07	1.87	1.09
Hauling .....	1.41	14.63	2.21	2.27
Manipulation .....	1.61	8.44	3.93	2.05
Bituminous surface treatment .....	.56	11.19	1.37	1.43
15-inch plain concrete pipe .....	.16	4.42	1.54	1.18
18-inch plain concrete pipe .....	1.34	5.27	1.96	1.44
24-inch plain concrete pipe .....	1.34	4.79	1.51	1.25

<sup>1</sup> Arithmetic averages.

excluded. For this purpose, the cost elements involved are divided into two groups.

### Group I items

In Group I are those items of direct expense involving compulsory payments in the form of taxes, fees, and assessments. The rates and amounts of the payments will vary depending upon whether they are applicable to force account work or to contract work. Group I covers the following items:

*Taxes.*—Sales, use, gasoline (State and Federal), lubricating oil, tires and tubes, automotive equipment and parts, property, communications, corporation franchise, intangibles, project, transportation, and income.

*Licenses, fees, and payments.*—Labor liability and compensation, social security, performance surety bond, project plans, licensing board fee, bidding license, and motor-vehicle license.

In the evaluation of these items the various job costs were analyzed to the extent necessary to depict the actual differences involved. For example, the State crushed most of its aggregate with benefit of tax exemption. On the contract jobs, therefore, a study was made of all payments to commercial producers of aggregate to determine the amounts of taxes and fees therein. Likewise, hauling of base course and other materials was performed by the State with the benefit of certain tax exemptions. Accordingly, investigations were made of all payments by the State and the contractor to hired haulers, except railroads, to determine the amount of taxes and fees involved. Rental payments for equipment were similarly checked.

The amount of the Group I items ranged from 0.2 to 0.9 percent of the total cost on the two State jobs and from 7.9 to 11.3 percent on the three contract jobs. Table 3 shows the percentages applicable to the individual work accounts which comprise the composite job.

Total costs of the Group I items in the composite job, obtained by application of the respective percentages shown in table 3 to the cost of each work account, are as follows:

Using State's costs.....	\$908
Using contractors' costs.....	12,885

With Group I items excluded, the apparent cost advantage is substantially in favor of the contractors' operations. On an individual job basis, each of the three contract jobs shows a lower cost than for either of the two State jobs.



Spreading mat stone over asphalt.



Applying asphalt to seal stone, followed by trucks pulling drag brooms.

### Group II items

Included in Group II are those items of expense involving optional or discretionary payments in the form of insurance and labor benefits. These differ from the items in Group I in that they fall, to some extent, within the purview of the State or contractor as a matter of management policy. Following are the items included in Group II: (1) Public liability payments or insurance premiums; (2) contributions to employee retirement funds; and (3) compensation for annual leave, sick leave, and holidays.

The State does not carry public liability insurance, but expenses are nevertheless incurred through cash payments for liability claims. There is a statutory limit of litigious liability in the case of the State of \$8,000 per claim. The contractor, on the other hand, has no such protection and is rarely in a position to be self-insured. Thus, he usually elects to obtain sufficient protection from insurance companies.

Expenses to the contractors for items 2 and 3 vary to a marked degree between different organizations and the amounts involved are usually determined by the respective managements. Expenses by the State for items 2 and 3 are established by enabling provisions of current civil service regulations. Thus, in the case of the State, these expenses might not be viewed as optional or discretionary. However, they are so considered herein to

enable uniformity of treatment with comparable items by the contractor.

Group II items amount to about 2.2 percent of the total project cost on the State jobs and 1.5 percent on the contract jobs. Much of the difference is due to the lower employer contributions and labor benefits on the contractors' jobs. This difference, however, is more than offset by the higher wages paid on the contractors' jobs. Effects of wage differentials are discussed later.

The percentages of the total cost of particular work accounts in the composite job represented by Group II items are shown in table 3.

Total costs of the Group II items in the composite job obtained by application of these percentages to the cost of each work account, are as follows:

Using State's costs.....	\$3,535
Using contractors' costs.....	2,087

In this instance, the deduction of Group II items from the costs of the composite job would reduce the margin in favor of the contractors.

### Wage rate differential

The average hourly wage rate on the contract jobs was about \$1.23. This compares with an average of \$0.975 on the State jobs. Since about 21 percent of the cost of the composite job, using contractors' costs, represented wages paid directly by the contractor, the contractors' job costs would have been

reduced by about \$5,860 by paying at the hourly rate prevailing on the State jobs. Included in this \$5,860 is approximately \$1,200 representing personal income taxes (State and Federal) that would have been paid out of this wage earning increment.

Certain employer contributions and other benefits to labor are associated with wage earnings. Had the wages been reduced on contractors' work in the amount of the aforementioned \$5,860, the corresponding benefits would have been reduced by about \$580. This amount is in addition to the \$5,860.

In summary, the additional costs borne by the contractors on the composite job which are attributable to the wage rate differential are as follows:

"Take-home" pay.....	\$4,660
Personal income taxes.....	1,200
Labor benefits.....	580
Total.....	6,440

This is a substantial amount the deletion of which favors the contractor. However, the extent to which labor productivity or other job factors might be affected by this hypothetical adjustment for wage rate differential was not determined.

### Length of haul

There were certain differences in lengths of haul among the several jobs. On excavation it was determined that actual haul distances averaged about 90 feet more on the contract jobs than on the State jobs. To compensate for this difference, an amount of \$0.005 per cubic yard was deducted from the cost of contract work on the composite job. The dollar amount is \$425.

For the base course, the average haul by the State and the contractor varied by such a minor distance that no adjustment was warranted.

In the case of bituminous surface treatment, the surface aggregate was hauled by truck from State-owned local quarries to the State jobs; by truck from local commercial sources on two of the contract jobs; and by a combination of rail and truck on the remaining contract job. The longer hauls prevailed on the contract jobs. The cost of hauling this additional distance amounted to about \$0.023 per square yard of bituminous surface treatment. The dollar amount of this reduction on the contractors' cost of the composite job is \$1,840.

The effect of the foregoing adjustments for haul lengths is to reduce the contractors' cost in each instance. The total reduction in the cost of the composite job, using contractors' costs, is \$2,265. This consists of \$425 for excavation and \$1,840 for surface aggregate.

### Base course materials

There were wide differences in practices for procuring base course materials that warrant consideration. On the State jobs, base course materials were obtained from State-owned and operated quarries and pits in the vicinity of the projects. For the contract jobs, crushed rock was obtained from commercial sources on one project and hauled by truck; commercially produced soil was shipped in by rail on another; and on the last contract

**Table 4.—Effect of certain cost variables on total cost of composite job**

Nature of variable	Amount of variable in composite job <sup>1</sup>		Total cost of composite job, after deducting the amount of the variable		
	State	Contract	State	Contract	Difference, in favor of contractors <sup>2</sup>
Group I items (taxes, fees, and assessments).....	\$908	\$12,885	\$138,997	\$121,687	\$17,310
Group II items (insurance and labor benefits).....	3,535	2,087	136,370	132,485	3,885
Wage rate differential.....	-----	6,440	139,905	128,132	11,773
Haul distance differential.....	-----	2,265	139,905	132,307	7,598
Base course materials.....	31,950	28,050	107,955	106,522	1,433
Interest on State's investment.....	2,385	-----	137,520	134,572	2,948

<sup>1</sup> Amounts are not additive.

<sup>2</sup> Includes the initially computed cost differential of \$5,333 in favor of the contractors.

job, soil was obtained by the contractor in local pits adjacent to the project.

There are several alternatives that would have materially affected the cost comparison. For example, the State could have elected to furnish materials to the contractor; on the other hand, the State could have elected to purchase either rock or soil from commercial sources. Any attempt to equalize the varying practices by computing probable costs for any one or a combination of these alternatives would require many assumptions that could not be supported by actual field data.

In view of these variables with respect to the base course item, it is likely that the most valid comparison would be that in which the cost of base course materials is eliminated. For the composite job, the cost of these materials was \$31,950 using State's prices and \$28,050 using contractors' prices. Elimination of these costs would tend to reduce the margin in favor of the contractors.

**Interest on equipment investment**

Whereas depreciation of equipment is an expense that must be met regardless of how the work is done, the matter of interest on the investment in equipment is a point on which opinion may differ. For purposes of uniformity, interest charges were computed in similar fashion on both State and contract jobs during the course of the studies. The total costs of interest tended to be somewhat higher on the contract jobs. This was due, in part, to the contractors' practice of keeping equipment on the job for somewhat longer periods of time. (On the State jobs, it was common practice to move idle or standby equipment off the job and put it to use on other nearby construction and maintenance work in the district.) Expressed as a percentage of the total costs of the composite job, interest costs were 1.6 percent on State work and 1.8 percent on contract work. By applying these percentages to the costs of the composite job on State work (\$139,905) and on contract work

(\$134,572) the following amounts are derived for interest on investment in equipment:

Using State's costs.....	\$2,385
Using contractors' costs.....	2,422

It is generally recognized that interest on the investment is a proper cost of contractors' work. From the standpoint of comparative economic cost, it is also a proper cost of State force work. However, it is a cost for which a public agency seeks no return and one which would not be met by actual cash transactions in case of State work. Hence, there is some basis for excluding this item of expense from the State's total costs.

**Other variables**

There were other variables. Some were of minor importance with respect to their effect on costs; others could not be readily evaluated. A few are as follows:

1. *Maintenance of public traffic.*—For the composite job, this expense amounted to \$384 on State work and \$320 on contract work.

2. *Moving in and moving out.*—For the composite job, this expense amounted to \$1,088 on State work and \$1,469 on contract work. Ordinarily it might be expected that this difference would be much greater. However, two of the contractors had permanent headquarters in the immediate vicinity of the projects. The other was about 100 miles distant. The State's expense was increased somewhat by the practice of frequently moving its equipment on and off the job to meet fluctuating requirements on other construction and maintenance work in the district. The contractors did not move their equipment quite so often.

3. *Age of equipment.*—The average age of trucks, for example, was about the same on three of the five jobs studied, one contract and two State jobs. It was about twice as great on one of the other contract jobs. On the third contract job, age data for trucks were not available.

4. *Size of equipment.*—The size of comparable units was about the same on all jobs.

There were certain exceptions, such as scrapers on the contract jobs which averaged about 30 percent larger than those used by the State.

5. *Major delays.*—Delays of 15 minutes or more in duration with weather excluded were about the same on both the State and the contract jobs.

6. *Minor delays.*—Delays of less than 15 minutes each in duration were slightly greater on the State jobs.

**Cost Comparison Summary of Composite Job**

As previously stated, the initial computation of total costs of the composite job shows the following:

Total cost of composite job, using State's average unit costs.....	\$139,905
Total cost of composite job, using contractors' average unit costs and excluding profit.....	134,572
Initially computed cost differential, in favor of contractors.....	5,333

The total costs and the differential will vary depending on the adjustments that may be made to show the effect of individual cost elements. The principal adjustments are listed in table 4. In the cases of the Group I items, the wage rate differential, and the haul distance differential, the adjustments result in increases in the original spread of \$5,333 between the costs of the composite jobs. In the other three instances listed in the table, the adjustments decrease the original spread but in no case is any one adjustment sufficient to overcome it completely.

With the exception of Group I and II items and interest, the variables listed in table 4 are not wholly additive. Each has been separately computed on the basis of its amount in the initially developed total cost of the composite job. There are, for example, Group I and Group II items involved in adjustments for wage differential, and all three together with interest are involved to a certain extent in the haul distance differential and base course materials.

A more refined analysis could be developed to show the net and cumulative effects of each of these variables and also give an indication of the amount of other cost variables which are not herein itemized or evaluated. Such computations would not, however, be sufficiently weighted in favor of State work to alter the finding that, exclusive of profit, contract work was performed at a lower construction cost than State force work on the five jobs studied. This finding is limited solely to the circumstances herein reported. No attempt was made in this particular study to determine whether or to what extent contract or State force work was the more economic in all phases.

**Motor-Vehicle Size and Weight Limits**

A comparison of State legal limits of motor-vehicle sizes and weights with standards recommended by the American Association of State Highway Officials is given in a table on pages 54-55. The statutory limits reported

in this tabulation, prepared by the Bureau of Public Roads as of July 1, 1956, have been reviewed for accuracy by the appropriate State officials.

Statutory limits are shown for width,

height, and length of vehicles; number of towed units; maximum axle loads for single and tandem axles; and maximum gross weights for single-unit trucks, truck-tractor semi-trailer combinations, and other combinations.

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Construction of Private Driveways, No. 272MP (1937). 15 cents.  
Criteria for Prestressed Concrete Bridges (1954). 15 cents.  
Design Capacity Charts for Signalized Street and Highway Intersections (reprint from PUBLIC ROADS, Feb. 1951). 25 cents.  
Electrical Equipment on Movable Bridges, No. 265T (1931). 40 cents.  
Factual Discussion of Motortruck Operation, Regulation, and Taxation (1951). 30 cents.  
Federal Legislation and Regulations Relating to Highway Construction (1948). Out of print.  
Financing of Highways by Counties and Local Rural Governments: 1931-41, 45 cents; 1942-51, 75 cents.  
General Location of the National System of Interstate Highways, Including All Additional Routes at Urban Areas Designated in September 1955. 55 cents.  
Highway Bond Calculations (1936). 10 cents.  
Highway Bridge Location No. 1486D (1927). 15 cents.  
Highway Capacity Manual (1950). \$1.00.  
Highway Needs of the National Defense, House Document No. 249 (1949). 50 cents.  
Highway Practice in the United States of America (1949). 75 cents.  
Highway Statistics (annual):  
1945 (out of print). 1949, 55 cents. 1953, \$1.00.  
1946, 50 cents. 1950 (out of print). 1954, 75 cents.  
1947, 45 cents. 1951, 60 cents.  
1948, 65 cents. 1952, 75 cents.  
Highway Statistics, Summary to 1945. 40 cents.  
Highways in the United States, nontechnical (1954). 20 cents.  
Highways of History (1939). 25 cents.  
Identification of Rock Types (reprint from PUBLIC ROADS, June 1950). 15 cents.  
Interregional Highways, House Document No. 379 (1944). 75 cents.  
Legal Aspects of Controlling Highway Access (1945). 15 cents.  
Local Rural Road Problem (1950). 20 cents.  
Manual on Uniform Traffic Control Devices for Streets and Highways (1948) (including 1954 revisions supplement). \$1.00.  
Revisions to the Manual on Uniform Traffic Control Devices for Streets and Highways (1954). Separate, 15 cents.

## PUBLICATIONS (Continued)

- Mathematical Theory of Vibration in Suspension Bridges (1950). \$1.25.  
Model Traffic Ordinance (revised 1953). Out of print.  
Needs of the Highway Systems, 1955-84, House Document No. 120 (1955). 15 cents.  
Opportunities in the Bureau of Public Roads for Young Engineers (1955). 25 cents.  
Principles of Highway Construction as Applied to Airports, Flight Strips, and Other Landing Areas for Aircraft (1943). \$2.00.  
Progress and Feasibility of Toll Roads and Their Relation to the Federal-Aid Program, House Document No. 139 (1955). 15 cents.  
Public Control of Highway Access and Roadside Development (1947). 35 cents.  
Public Land Acquisition for Highway Purposes (1943). 10 cents.  
Public Utility Relocation Incident to Highway Improvement, House Document No. 127 (1955). 25 cents.  
Results of Physical Tests of Road-Building Aggregate (1953). \$1.00.  
Roadside Improvement, No. 191MP (1934). 10 cents.  
Selected Bibliography on Highway Finance (1951). 60 cents.  
Specifications for Construction of Roads and Bridges in National Forests and National Parks, FP-41 (1948). \$1.50.  
Standard Plans for Highway Bridge Superstructures (1953). \$1.25.  
Taxation of Motor Vehicles in 1932. 35 cents.  
Tire Wear and Tire Failures on Various Road Surfaces (1943). 10 cents.  
Transition Curves for Highways (1940). \$1.75.

## MAPS

- State Transportation Map series (available for 39 States). Uniform sheets 26 by 36 inches, scale 1 inch equals 4 miles. Shows in colors Federal-aid and State highways with surface types, principal connecting roads, railroads, airports, waterways, National and State forests, parks, and other reservations. Prices and number of sheets for each State vary—see Superintendent of Documents price list 53.  
United States System of Numbered Highways. 28 by 42 inches, scale 1 inch equals 78 miles. 20 cents.

Single copies of the following publications are available to highway engineers and administrators for official use, and may be obtained by those so qualified upon request addressed to the Bureau of Public Roads. They are not sold by the Superintendent of Documents.

- Bibliography on Automobile Parking in the United States (1946).  
Bibliography on Highway Lighting (1937).  
Bibliography on Highway Safety (1938).  
Bibliography on Land Acquisition for Public Roads (1947).  
Bibliography on Roadside Control (1949).  
Express Highways in the United States: a Bibliography (1945).  
Indexes to PUBLIC ROADS, volumes 17-19 and 23.  
Title Sheets for PUBLIC ROADS, volumes 24-28.

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DEPARTMENT OF COMMERCE - BUREAU OF PUBLIC ROADS  
**STATUS OF FEDERAL-AID HIGHWAY PROGRAM**

AS OF JUNE 30, 1956

(Thousand Dollars)

STATE	UNPROGRAMMED BALANCES <sup>1/</sup>	ACTIVE PROGRAM											
		PROGRAMMED ONLY			PLANS APPROVED, CONSTRUCTION NOT STARTED			CONSTRUCTION UNDER WAY			TOTAL		
		Total Cost	Federal Funds	Miles	Total Cost	Federal Funds	Miles	Total Cost	Federal Funds	Miles	Total Cost	Federal Funds	Miles
Alabama	\$26,442	\$14,910	\$8,123	212.2	\$5,370	\$2,863	40.7	\$46,628	\$24,755	651.5	\$66,908	\$35,741	904.4
Arizona	14,328	4,288	3,225	72.0	2,356	1,724	34.1	11,321	8,393	101.6	17,965	13,342	207.7
Arkansas	23,973	15,734	7,887	505.9	5,122	2,632	46.5	22,773	11,766	480.2	43,629	22,285	1,032.6
California	67,340	18,614	10,094	199.4	9,747	4,902	9.7	147,987	76,255	247.0	176,348	91,251	456.1
Colorado	27,597	8,408	4,832	157.4	1,078	611	4.6	21,129	11,479	225.0	30,615	16,922	387.0
Connecticut	30,536	4,083	1,956	7.2	2,015	1,125	7.6	12,772	6,437	20.2	18,870	9,518	35.0
Delaware	10,746	3,490	1,749	33.4	1,188	611	14.2	5,685	2,847	49.4	10,363	5,207	97.0
Florida	24,979	6,859	3,629	107.3	13,779	7,101	45.0	37,501	19,425	336.0	58,139	30,155	488.3
Georgia	37,181	32,641	16,596	709.3	13,136	6,774	109.9	47,664	22,631	778.6	93,441	46,001	1,597.8
Idaho	16,652	4,680	3,010	108.3	2,860	1,892	72.9	13,948	9,044	204.9	21,488	13,946	386.1
Illinois	61,677	34,818	18,233	619.1	17,862	9,003	83.8	101,527	54,716	625.4	154,207	81,952	1,328.3
Indiana	48,451	20,917	11,384	90.4	15,951	8,185	169.7	47,981	26,195	206.3	84,849	45,764	466.4
Iowa	27,753	18,859	10,864	757.9	4,959	2,773	78.4	31,020	16,680	896.4	54,838	30,317	1,732.7
Kansas	24,921	11,601	5,811	924.2	9,371	4,841	161.1	28,505	14,787	818.4	49,477	25,439	1,903.7
Kentucky	32,357	6,856	3,462	154.9	1,727	870	4.1	42,184	22,517	614.0	50,767	26,849	773.0
Louisiana	21,594	22,938	11,637	75.5	3,982	1,998	9.0	42,396	20,771	372.2	69,316	34,406	456.7
Maine	11,643	10,522	5,417	89.6	1,468	812	8.7	15,492	7,983	103.8	27,482	14,212	202.1
Maryland	17,009	18,131	9,278	121.6	16,627	7,712	23.6	24,097	12,436	153.6	58,855	29,426	298.8
Massachusetts	33,060	20,293	10,137	22.9	13,378	7,252	8.9	42,310	20,466	62.2	75,981	37,855	94.0
Michigan	45,648	33,172	16,698	656.2	20,707	10,886	95.0	65,158	33,772	544.8	119,037	61,356	1,296.0
Minnesota	29,901	9,132	4,749	580.7	7,182	3,799	63.4	47,656	25,551	1,529.7	63,970	34,099	2,173.8
Mississippi	26,015	11,608	5,733	463.0	5,078	2,889	115.3	25,486	12,907	769.7	42,172	21,529	1,348.0
Missouri	35,681	20,361	10,509	1,103.3	6,553	3,490	12.9	78,428	40,941	1,469.5	105,342	54,940	2,585.7
Montana	26,636	11,553	6,845	283.4	4,301	2,611	54.1	30,042	18,668	542.4	45,896	28,124	799.9
Nebraska	28,930	9,046	4,891	290.6	4,548	2,283	93.3	34,874	18,532	1,037.3	48,468	25,706	1,421.2
Nevada	17,212	6,673	5,569	86.4	708	591	25.1	11,094	9,363	203.2	18,475	15,523	314.7
New Hampshire	11,970	2,633	1,499	16.1	556	304	2.4	10,073	5,157	61.5	13,262	6,960	80.0
New Jersey	39,937	12,629	6,324	54.8	6,972	3,064	17.3	35,351	17,088	45.8	54,952	26,476	117.9
New Mexico	17,042	1,965	1,256	17.4	4,399	2,865	62.5	12,535	8,088	180.6	18,899	12,209	260.5
New York	103,102	25,042	13,040	86.2	56,130	30,505	97.1	234,331	111,018	324.5	315,503	154,563	507.8
North Carolina	35,069	20,031	9,829	315.8	2,964	1,498	68.4	57,819	28,424	780.3	80,814	39,751	1,164.5
North Dakota	16,135	8,388	4,256	1,005.3	10,641	5,566	664.0	13,086	6,669	719.8	32,115	16,491	2,389.1
Ohio	61,392	53,383	27,827	205.9	9,511	4,780	51.2	90,204	45,032	144.1	153,098	77,639	401.2
Oklahoma	29,114	15,495	8,110	288.7	13,874	7,153	183.4	41,017	21,203	392.3	70,386	36,466	864.4
Oregon	17,296	3,805	2,247	71.9	848	507	6.2	29,136	17,912	278.9	33,789	20,666	357.0
Pennsylvania	71,717	44,177	23,418	153.0	22,311	11,135	47.0	127,986	64,072	381.1	194,474	98,625	581.1
Rhode Island	8,218	1,987	994	4.7	1,609	810	1.0	18,964	9,795	28.2	22,560	11,599	33.9
South Carolina	22,012	17,952	9,734	299.9	1,976	1,240	11.0	21,277	11,018	483.2	41,205	21,992	794.1
South Dakota	13,456	15,815	9,203	621.4	7,892	4,567	212.6	18,175	10,364	675.4	41,882	24,134	1,509.4
Tennessee	37,103	16,830	8,130	426.7	7,677	3,841	19.9	49,861	23,089	556.5	74,368	35,060	1,003.1
Texas	73,648	15,577	8,068	345.2	17,310	9,423	124.0	123,379	64,715	1,688.2	156,266	82,206	2,157.4
Utah	11,546	8,065	5,913	172.8	1,442	1,093	15.5	13,335	9,991	147.3	22,842	16,997	335.6
Vermont	10,537	1,263	632	23.6	1,310	654	7.3	10,693	5,514	94.2	13,266	6,800	125.1
Virginia	31,027	17,574	9,302	304.3	7,920	4,158	100.1	33,103	16,477	340.2	58,597	29,937	744.6
Washington	20,714	14,198	7,972	174.9	9,667	5,154	107.1	27,540	14,957	260.4	51,405	28,083	542.4
West Virginia	24,928	12,915	6,664	57.2	7,048	3,628	21.3	16,737	8,422	53.3	36,700	18,714	131.8
Wisconsin	34,042	13,188	6,731	242.0	7,582	3,980	35.7	52,751	25,956	535.5	73,521	36,667	813.2
Wyoming	12,232	4,431	2,921	70.5	2,917	1,846	40.2	18,006	11,853	346.7	25,354	16,620	457.4
Hawaii	3,623	3,416	1,698	9.8	4,101	1,981	3.8	3,972	2,001	4.2	11,489	5,680	17.6
District of Columbia	8,228	13,976	8,019	2.5	2,564	1,265	1.2	7,604	3,785	.7	24,144	13,069	4.4
Puerto Rico	7,425	6,605	2,658	18.7	3,438	1,698	3.6	18,751	8,687	60.4	28,794	13,043	82.5
Alaska	1,933												
<b>TOTAL</b>	<b>1,491,708</b>	<b>731,527</b>	<b>388,763</b>	<b>13,341.4</b>	<b>403,712</b>	<b>212,945</b>	<b>3,295.4</b>	<b>2,121,344</b>	<b>1,100,604</b>	<b>21,626.6</b>	<b>3,256,583</b>	<b>1,702,312</b>	<b>38,263.4</b>

<sup>1/</sup> Includes additional funds authorized by Federal-aid Highway Act of 1956 apportioned June 29, 1956.

04.4  
07.7  
32.2  
56.1  
87.9  
35.0  
97.0  
88.8  
37.2  
386.1  
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295.2  
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173.1  
348.0  
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421.2  
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117.9  
260.8  
597.8  
1,164.7  
2,389.1  
401.2  
864.4  
357.8  
581.1  
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1,509.2  
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2,157.8  
335.4  
125.1  
744.0  
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131.8  
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